PRICE DISCRIMINATION AND BIG DATA: HIGHEST PRICES EVERY TIME WE CLICK?

MASTER'S THESIS

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ABSTRACT

First-degree price discrimination has been known to theoretically allow the firm to extract full surplus from consumers. However, it has been assumed that first-degree price discrimination is not possible, as firms do not have information on the willingness to pay at the individual level. While sound historically, this argument may no longer hold. Large datasets on individual behavior, popularly referred to as "Big Data," are now readily available, and contain information potentially useful for person-specific pricing.[1]

This thesis aims to allow the public to understand the impact and importance of Big Data on our daily lives when dealing with price discrimination in e-commerce and transactional platforms. It seeks to increase consciousness of how the information we provide to a website and our behavior when we have the mouse in our hand could impact our wallets.

The thesis aspires to inquire into what competition authorities could do to mitigate the risks discussed – both through regulation and competition. It proposes the issuance of a new regulation aiming to address the core market failure of perfect price discrimination which seems to fall within a regulatory gap, jeopardizing consumer's welfare.

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[1]   Shiller, Benjamin Reed, 'First-Degree Price Discrimination Using Big Data' (2014) <https://www.brandeis.edu/economics/RePEc/brd/doc/Brandeis_WP58R2.pdf> accessed June 3, 2022.

I

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INTRODUCTION

Price discrimination is the ability of a supplier to charge different prices for the same product or service. If producers could discriminate by charging each consumer their willingness to pay, they "steal" the consumer surplus and it becomes producer surplus. Price discrimination is something that producers would like as it increases their profit without increasing their costs.[2] Achieving perfect (first degree) price discrimination is not an easy task. Lack of information, also known as asymmetric information, precludes producers from knowing how much each consumer values a product and how much she or he is willing to pay.[3]

However, Big Data may be changing the understanding we have about where we would like to go by diminishing asymmetric information when dealing with e-commerce and platforms. Big data allows platforms to analyze users' information in real-time. Search engines and platforms collect and store information about what consumers searched for and how they interacted with the results.[4] It enables companies to learn about their customers' preferences in real-time and with much more detail than before. This allows platforms to determine the elasticity of demand and if the consumer is in an emotional "*hot state*", which enables the provider to offer targeted sales.[5]

Yet, price discrimination can enhance efficiency by allowing output to be increased (allocative efficiency). It enables transactions to customers that would not be made if the price was the same for everyone. Charging non-uniform prices can expand the volume of products or services offered but does not necessarily improve consumer welfare (understood as consumer surplus) if it allows the supplier to charge higher prices to each consumer.[6]

To address and discuss the foregoing, the main research question of this thesis is:

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[2] Lambert, T. A. *How to Regulate* (Cambridge University Press, 2017), pp. 137-138.

[3] ibid.

[4] Competition and Markets Authority, 'Online Platforms and Digital Advertising market study, Appendix I: search quality and economies of scale' (2020) <Appendix I: search quality and economies of scale> accessed February 10, 2022.

[5] Scott Morton et al., 'Executive summary of market structure and antitrust subcommittee' (2019), <https://www.judiciary.senate.gov/imo/media/doc/market-structure-report%20-15-may-2019.pdf> accessed March 10, 2022.

[6] Whish & Bailey, *Competition Law* (Oxford, 10th edition, 2020) | Niels, Jenkins and Kavanagh, *Economics for Competition Lawyers* (Oxford, 2nd edition, 2016).

How does Big Data allow companies to engage in first-degree price discrimination and why should this be a competition law concern?

If Big Data allows companies, regardless of their market power, to engage in price discrimination and charge higher prices to selected customers, it may be that specific regulation should be considered to mitigate this issue and protect consumers. Being able to charge monopoly prices and/or extract the entire consumer surplus without having market power and without engaging in cartel activities seems to be something that should matter to competition agencies.

Competition policy is usually the tool to use against price discrimination when there is market power accumulation and/or cartelization, but a regulatory approach will also be considered in this thesis given the new challenges digital markets pose and the faster accumulation of market power/collusion options on them. In this sense, the current work would like to explore the options for tackling the issue of perfect price discrimination through both ex-post competition tools and through ex-ante regulation.

This thesis is divided into four chapters. The first chapter will describe the definition, elements, and related concepts of price discrimination. It will discuss the advantages and disadvantages of first-degree (or perfect) price discrimination and how the European Commission and the European Court of Justice had analyzed it. The second chapter will explain what Big Data is, how it allows companies to obtain information from consumers and what type of information is obtained. The third chapter will discuss if and how companies can use the information obtained through Big Data to engage in perfect price discrimination. It will explain the impact this has on consumers and suppliers. Lastly, chapter four will analyze a possible competition or regulatory response to the issue of Big Data and perfect price discrimination (ex-ante or ex-post regulation).

The methodology to be applied would be qualitative desk research, relying on existing information. Mainly, journal articles and case law or case reports related to asymmetric information, Big Data, excessive pricing, and artificial intelligence will be consulted. Access to these documents and information will be obtained through search engines, such as WorldCat and Google Scholar, as well as SSRN and Eur-Lex. The search will be performed through keywords such as 'asymmetric information', 'price discrimination', 'Big Data', 'excessive pricing', 'micro-targeting', 'individualized prices', and 'artificial intelligence'. Also, draft or enacted legislation in European Union will be consulted. The information

obtained from the research will then be analyzed, processed, and consolidated to produce answers to each of the research sub-questions and – ultimately – to the main research question.

CHAPTER I

THE LEGAL AND ECONOMIC CONCEPT OF PRICE DISCRIMINATION

Price discrimination consists of the ability of a supplier or service provider to charge different prices to consumers for the same product or service. Producers should acknowledge the willingness to pay of each consumer, and then they will be capable of 'stealing' the consumer welfare to turn it in a producer surplus. It enables producers to sell a higher number of units and increase their profit without affecting their costs.[7]

When differential pricing is possible, economic theory suggests that it can produce both costs and benefits. The main benefit, under certain conditions, is that differential pricing allows undertakings to expand the size of the market.[8] For example, airplane tickets prices encourage certain travelers on a tight budget to search for offers, book in advance, travel on low season, among others. If airlines were prohibited from using this type of differential pricing, it might decide to keep prices high and leave some seats empty. This would mean less profit for the airlines and fewer people traveling.

Similarly, financial aid packages help universities bring in more tuition by charging the list price to those who can afford it, while educating more students who might be excluded if need or merit-based financial aid were prohibited. These forms of differential pricing typically generate few objections because they appeal to customers' sense of fairness – companies charge a bit more to the least price-sensitive customers, who can probably afford it, and a lower price to those who cannot.[9]

Whether price discrimination helps or harms average consumers, firms, or the market itself, depends on how and where it is used. As explained below, there are different types or 'levels' of price discrimination, each with different characteristics and consequences. Also, there are different perspectives from the legal and economic background, which are also detailed herein.

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[7] Lambert, (n 2), pages 137 and 138.

[8] Executive Office of the President of the United States, 'Big Data and Differential Pricing' (2015) <https://obamawhitehouse.archives.gov/sites/default/files/whitehouse_files/docs/Big_Data_Report_Nonembargo_v2.pdf?utm_source=Bruegel+Updates&utm_campaign=656e7da39b-Blogs+review+11%2F02%2F2017&utm_medium=email&utm_term=0_eb026b984a-656e7da39b-278510293> accessed April 5, 2022.

[9] ibid.

I.A   THE LEGAL CONTEXT OF PRICE DISCRIMINATION

Pursuant to Article 102(c) of the Treaty on the Functioning of the European Union ("TFEU"), undertakings with a dominant position are prohibited from applying 'dissimilar conditions to equivalent transactions with other trading parties, thereby placing them at a competitive disadvantage'.

There is no case for a *per se / by object* prohibition of price discrimination within the European Union legal framework. Whereas Article 101 of the TFEU concerns agreements, decisions, and concerted practices which are harmful to competition, Article 102 is directed towards unilateral conduct of dominant firms which act in an abusive manner. Hence, price discrimination is deemed as an abusive pricing practice and may be considered abuse of dominance conduct that may infringe Article 102 of the TFEU.[10]

Before analyzing the case law that sets the requirements to sanction a price discrimination conduct, it is important to understand the type of conduct we are dealing with. It will be discussed how the current competition legal framework in the EU is not sympathetic to catching perfect price discrimination as problematic conduct. While it is difficult to fit it under Article 101 TFEU, Article 102 TFEU is more promising, but it does not get triggered easily due to the exclusionary and exploitative analysis needed and the dominance element required.

I.A.1   EXCLUSIONARY AND EXPLOITATIVE ABUSES

When reviewing the decisional practice of the European Commission and the jurisprudence of the EU Courts, we can identify at least two types of abuse of dominance conducts: exploitative and exclusionary abuses.[11]

Exploitative makes reference to the concept of 'exploiting customers'. The monopoly firm is in a position where it can reduce output and increase its prices above a competitive level, thereby exploiting customers. However, exploitative conducts are not limited to pricing to end users or consumers. It includes the imposition of *unfair* purchase or selling prices or other unfair trading conditions. For example, there have been cases in which the activities

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[10]   Whish & Bailey (n 6), pages 180 and 777 to 782.
[11]   Whish & Bailey (n 6), page 207.

of a collecting society were analyzed to ensure that they do not act in a way that unfairly exploits the owner of a copyright of the terms of a license that would be granted therein.[12]

On the opposite, the concern about exclusionary abuses it that a dominant firm is able to behave in a wat that leads to anti-competitive foreclosure, and thereby prevent potential competitors to entry the market. The foreclosure may occur in the upstream or downstream market. In the doctrine, price discrimination is listed as an example of an exclusionary abuse.[13]

However, it should be emphasized that price discrimination is not, in as in itself, an exclusionary abuse (as recognized by the EU Courts in *Post Danmark I,* as explained below). Price discrimination may be exploitative of costumers, where higher prices are charged to some of them without any fair and reasonable justification.[14]

I.A.2 CASE LAW FOR PRICE DISCRIMINATION

The most recent guidance from the Court of Justice of the European Union ("CJEU") for assessing discriminatory pricing practices under EU competition law was provided in April 2018 with its ruling in case C-525/16 *MEO v. Autoridade da Concorrencia*[15] (the NCA of Portugal). The request for a preliminary ruling concerns the interpretation of point (c) of the second paragraph of Article 102 TFEU was made in the course of proceedings between MEO and the NCA of Portugal concerning the latter's decision to take no further action on MEO's complaint against GDA (Cooperative for the Management of the Rights of Performing Artists, Portugal) concerning an alleged abuse of a dominant position, in particular, discrimination in the amount of the royalty which GDA charged MEO in its capacity as an entity which provides a paid television signal transmission service and television content.[16]

Consistent with *British Airways v Commission*[17]*,* in the *MEO* case, the CJEU emphasized that for the conditions for applying 102 (c) to be met, there must be a finding, not only that the behavior of an undertaking in a dominant market position is discriminatory, but also that it

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12   Whish & Bailey (n 6), page 208.
13   ibid, 210 and 216.
14   ibid.
15   C-525/16 *MEO v. Autoridade da Concorrencia* [2018] EU:C:2018:270.
16   ibid, paras 1-2.
17   C-95/04 P *British Airways v Commission* [2007] EU:C:2007:166, para 144.

tends to distort that competitive relationship, in other words, discriminatory pricing is abusive only where the price discrimination "tends to distort competition".[18]

The CJEU considered that all the circumstances of the case should be considered, on a base-by-case basis. These conditions include the undertaking's dominant position, the negotiating power as regards the tariffs, the conditions and arrangements for charging those tariffs, their duration and their amount, and the possible existence of a strategy aiming to exclude from the downstream market one of its trade partners which is at least as efficient as its competitors.[19]

Following the earlier ruling of the Court in *Post Denmark I*[20], the CJEU ruling recognized the importance of an effect-based approach stating that discriminatory pricing does not alone suggest that an exclusionary abuse exists. The Court also ruled that the concept of 'competitive disadvantage', for the purposes of subparagraph (c) of the second paragraph of Article 102 TFEU, must be interpreted to the effect that, where a dominant undertaking applies discriminatory prices to trade partners on the downstream market, it covers a situation in which that behavior is capable of distorting competition between those trade partners, which does not require proof of actual quantifiable deterioration in the competitive situation, but must be based on an analysis of all the relevant circumstances of the case leading to the conclusion that that behavior has an effect on the costs, profits or any other relevant interest of one or more of those partners.[21]

In short, case law provides that five issues should be considered to determine whether price discrimination can infringe Article 102 TFEU, including (1) a dominant position of the undertaking; (2) whether the undertaking entered into equivalent transactions with other trading parties; (3) if the dominant undertaking is guilty of applying dissimilar conditions to equivalent transactions; (4) could the discrimination place other trading parties at a *competitive disadvantage*; and (5) whether there is an objective justification.[22]

In this thesis, we will not consider whether the price discrimination that will be analyzed is legal or illegal, as it could easily be concluded that undertakings engaging in price discrimination will be on the safe side as long as they do not have a dominant position and

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[18]   C-525/16, paras 25 - 27.
[19]   ibid, para 31.
[20]   C-209/10 *Post Danmark A/S v Konkurrencerådet* [2012] EU:C:2012:172.
[21]   C-525/16, para 27 and 37.
[22]   Whish & Bailey (n 6), pages 777 to 782.

comply with the other elements set forth above. As it will be furthered explained below, the market failure that Article 102 aims to tackle is market failure, while there may be other market failures involved in price discrimination (i.e., asymmetric information) which are not forbidden in the current legal framework, as long as it is not made by a dominant firm. What we would want to analyze and discuss in this thesis is exactly how, regardless of the market share or dominant position of an undertaking, Big Data could allow an undertaking to engage in perfect price discrimination and whether this should be a competition concern, even if it does not fall within Article 102 TFEU.

I.B   THE ECONOMIC CONTEXT OF PRICE DISCRIMINATION

I.B.1   DEFINITION AND TYPES OF PRICE DISCRIMINATION

There are three basic requirements that would enable an undertaking to engage in price discrimination. First, the seller must control the price. Second, the seller should be able to divide its customers into different categories or segments, depending on the elasticities of demand. To divide its customers or identify the individual elasticity of demand, the seller must have enough information about each customer or customers group's willingness to pay. Third, there must be limited differentiation in prices charged, to avoid low-price customers reselling the product to high-price customers.[23]

Economists make a distinction between three different types or degrees of price discrimination. First-degree (or 'perfect price discrimination'), takes place when the seller acknowledges and charges each buyer the maximum amount they are willing to pay. In this type of price discrimination, the seller captures the entire consumer surplus. Second-degree price discrimination occurs when the seller offers different deals, and each customer chooses which one she/he prefers. For example, internet and mobile carriers offer different price and content packages and each customer selects based on its own preferences. Lastly, third-degree price discrimination consists of the seller charging different prices to different groups of customers that share characteristics. For example, student discounts, cinema tickets for adults or children, among others.[24]

For purposes of this work, we will focus on first-degree or perfect price discrimination, which is the hardest to achieve and the most related to the willingness to pay of each user.

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[23]   Niels, Jenkins and Kavanagh, *Economics for Competition Lawyers* (Oxford, 2nd edition, 2016), page 181.
[24]   ibid.

Achieving perfect price discrimination is hard due to asymmetric information. The concept of asymmetric information was first introduced by Akerlof in 1970 in his paper on the market for 'lemons' (terminology used in the United States for used cars). He explains that asymmetric information leads to inefficient outcomes in certain markets due to the imbalance of information between buyers and sellers.[25] The lack of information, precludes producers to know how much each consumer values a product and how much she or he is willing to pay.[26] Information asymmetry supposes that when a buyer and a seller come together to make decisions, in many cases, one possesses more information than the other, affecting their behavior. The recent explosion in the use of Big Data Analytics has led to understandable concern about its potential impact in increasing the knowledge gap and acting to the advantage of the seller.[27]

For the last 50 years, asymmetric information has been considered a market failure. Lawmakers and agencies continuously work towards diminishing asymmetric information between parties to a transaction, through licensing, and mandatory disclosure, among others.[28] Avoiding asymmetric information could lead to a market closure to perfect competition, avoiding related market failures as moral hazard or adverse selection.

I.B.2   ECONOMIC ASSESSMENT OF PRICE DISCRIMINATION

It seems that perfect price discrimination is not good or bad by itself. While it may be beneficial for some consumers and suppliers, it may affect others. To provide a more in-depth analysis of the purposes of perfect price discrimination and its -positive and negative-effects, it is important to understand the difference between the economic concepts: consumer surplus, total welfare, and producer surplus.

In economics, consumer surplus, also referred to as consumer welfare, refers to the difference between what consumers would have been willing to pay for a good or service

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[25]   Akerlof, G., *The market for "lemons": Quality uncertainty and the market mechanism; The Quarterly Journal of Economics* (Vol. 84(3), 1970, pp 488–500).

[26]   ibid.

[27]   Karine Aoun Barakat and May Sayegh, 'Information Asymmetry in the Age of Big Data Analytics' (2021), <https://www.researchgate.net/publication/349412294_Information_Asymmetry_in_the_Age_of_Big_Data_Analytics> accessed June 3, 2022.

[28]   Lambert (n 2), chapter 8.

and what they had to pay. On the other hand, producer surplus refers to producers' profit. Hence, total welfare is the sum of consumer surplus and producer surplus.[29]

Total welfare may therefore increase in a situation where consumer welfare is decreasing, if the profits of the producers increase more than the decrease in consumer welfare. Although is it not what current antitrust economists would defend, for some economists, total welfare, rather than consumer welfare, ought to be the guiding principle of competition policy. This approach considers that making the pie (total welfare) as big as possible is expected and would provide efficient outcomes.[30]

Price discrimination can enhance efficiency by allowing output to be increased (allocative efficiency) and therefore, increasing total welfare. It enables transactions to customers that would not be made if the price was the same for everyone. Charging non-uniform prices can expand the volume of products or services offered but does not necessarily improve consumer welfare if it allows the supplier to charge higher prices to each consumer.[31]

The economist Frank Ramsey provided us with an example of efficient price discrimination. 'Ramsey pricing' occurs when customers with greater willingness to pay and less elastic demand are charged higher prices. Meaning, that the price charge to each user responds to his or her price sensitivity. Therefore, the total output will be increased, and economic efficiency will therefore be maximized.[32] The principle of Ramsey pricing has been accepted by regulators and competition authorities, but also rejected in two UK investigations involving the mobile telephony sector.[33]

However, even if the amount of total welfare remains the same, when engaging in first-degree price discrimination, consumer welfare will become producers' welfare, allowing producers to 'steal' from consumers all their surplus. Additionally, there are some other competition law concerns arising from price discrimination. As explained above, when dealing with price discrimination, it is not only a matter of exclusionary harm to other firms in the market, but also consumers can be affected by the exploitative effects of this conduct. Hence, perfect price discrimination could potentially have negative effects for competitors,

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[29] Svend Albæk, 'Consumer Welfare in EU Competition Policy' (2013), <https://ec.europa.eu/dgs/competition/economist/consumer_welfare_2013_en.pdf> accessed April 18, 2022, pages 70 and 71.
[30] ibid, 71.
[31] Whish & Bailey (n 6).
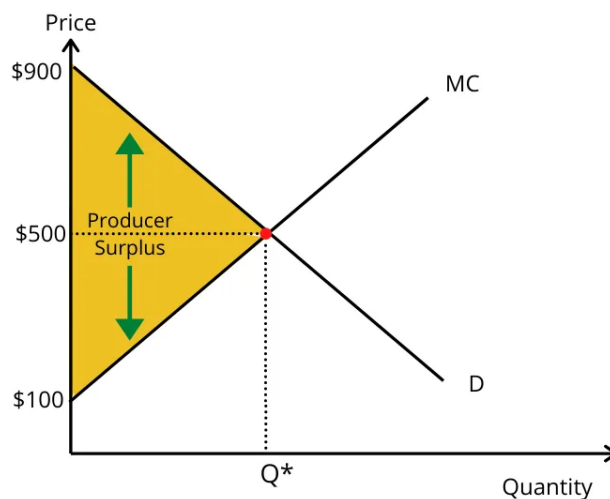[32] Niels, Jenkins and Kavanagh (n 23), page 182.
[33] Whish & Bailey (n 6).

markets and users. First, charging low prices to some consumers could take the form of predatory pricing and have the effect of excluding competitors (compensating the losses with high-price consumers). Second, price discrimination may distort competition in the downstream market if customers are competitors in such market. Third, an undertaking may be exploiting the group of customers to which it charges the higher prices. Lastly, discrimination along national boundaries could be seen as against the objective of the European Union of creating a single market.[34]

I.B.3   FIRST DEGREE PRICE DISCRIMINATION GRAPH

As previously explained, in normal market conditions (i.e., without price discrimination), consumers would pay a price which is usually less than they would otherwise be willing to pay. Firms wouldn't be able to know the willingness to pay of each individual and there are uniform prices for all consumers. The difference between what they are willing to pay and what they pay is the consumer surplus mentioned above.

In perfect price discrimination, there is no consumer surplus as each consumer pays the maximum they are willing to and there is no deadweight loss. This means that the consumer surplus and the deadweight loss that could exist on a competitive market now belongs to the producer and is shown in the form of profits.

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[34]   Joaquín Almunia, *'Competition and consumers: the future of EU competition policy'* (speech at European Competition Day, Madrid, 12 May 2010).

The graph demonstrates the relationship between the firm and its consumers. For example, at $900, demand is equal to zero, but starts to increase along the demand curve. It demonstrates the relationship in the entire market, as opposed to that of an individual customer. At $800, demand starts to increase. This might mean that 100 customers are willing to pay this price, whilst the marginal cost for these is around $300 – which would mean the producer surplus for these is $500.[35]

The price gradually decreases, accounting for more and more producer surplus as we go down the demand curve and reach the equilibrium point at $500. It is important to note that after this point, the price consumers would be willing to pay is less than it would cost to produce more goods – which is why the firm stops production at this point. Across the market, there are thousands and millions of consumers that are purchasing all at different prices between $900 and $500. For each consumer, the firm makes a profit, known as the producer surplus. It will vary from consumer to consumer, depending on how much they paid. In normal market conditions (i.e., a competitive market), consumer surplus would be anything under the demand curve and the competitive price curve; however, when the firm engages in first-degree price discrimination, all of this consumer surplus is eroded and replaced by producer surplus because of price discrimination.

I.C   EU COMPETITION POLICY REGARDING TOTAL WELFARE AND CONSUMER SURPLUS

After understanding the difference between consumer surplus, total welfare, and producer surplus, we can reasonably understand that the (main) aim of EU competition policy is to protect consumer welfare or consumer surplus.[36] Joaquín Almunia, former commissioner of the European Competition Commission, stated that 'Competition policy is a tool at the service of consumers. Consumer welfare is at the heart of our policy and its achievements drives our priorities and guide our decisions'.[37]

In the *Post Danmark I* judgment, the CJEU mentioned for the first consumer welfare as something that should be taken care of along with competition in any affected market.[38] This was interpreted as showing willingness on the part of the Court to finally recognize

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[35]   Paul Boyce, 'First Degree Price Discrimination Definition' (2021), <https://boycewire.com/first-degree-price-discrimination/> accessed May 18, 2022.

[36]   Svend Albæk (n 29) page 68.

[37]   Niels, Jenkins and Kavanagh (n 23), page 184.

[38]   C-209/10, para 42.

consumer welfare after judgments which had put the validity of consumer welfare as a goal for EU competition law into question.[39]

In the 2004 Notice on the application of the former Article 81(3) EC, the Commission presented consumer welfare and allocative efficiency as the goals of Article 101 TFEU.[40] This approach can also be indirectly found in official documents, such as the Horizontal Mergers Guidelines, which provide that 'Effective competition brings benefits to consumers, such as low prices, high quality products, a wide selection of goods and services, and innovation. Through its control of mergers, the Commission prevents mergers that would be likely to deprive customers (…)'.[41]

We can notice that the EU policy stands against perfect price discrimination, as long as it increases producers' surplus due to the decrease of consumer surplus, even if this does not affect or even increase total welfare. However, Article 102 (c) TFEU along with the case law discussed make it clear that price discrimination will only be sanctioned as long as it complies with the requirements described above, including the engagement by a dominant firm and if the conduct has the effect of placing market players at a competitive disadvantage. That explains why it is so difficult to catch price discrimination under the current competition legal framework.

In other words, while consumer surplus maximization is intended to be (and should be) seen as a goal for competition policy, it seems to be unprotected from perfect price discrimination, unless it complies with the strict requirements provided by the legal framework. The market failure at the core of perfect price discrimination (i.e., asymmetric information) is different from the market failure that is targeted by competition law or, at least, specifically by 102 (c) TFEU (i.e., market power). Hence, as it will be further discussed, regulation might be the proper solution for the problem at hand, which is a market failure discrepancy observed.

Along with the following chapters, this thesis would rise the discussion of new and currently discussed forms of price discrimination, based on Big Data analytics, as well as

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[39]   Victoria Daskalova, 'Consumer Welfare in EU Competition Law: What Is It (Not) About?' (2015), <https://ris.utwente.nl/ws/portalfiles/portal/6930761/Vol11Issue1Art6Daskalova.pdf> accessed May 6, 2022.

[40]   Commission (EU), Notice: Guidelines on the application of Article 81(3) of the Treaty [2004] OJ C 101/97.

[41]   Commission Notice, Guidelines on the assessment of horizontal mergers under the Council Regulation on the control of concentrations between undertakings [2004], 2004/C 31/03.

targeted marketing and individualized pricing. This discussion illustrates how the new forms of price discrimination such as behavior-based price discrimination, location-based pricing and other strategies involving personalized prices are challenging conventional wisdom regarding the welfare effects of competitive price discrimination. Scholars and practitioners are currently discussing the pros and cons of price discrimination through new technologies allowing for personalized communication between firms and their customers.[42] This makes it even more important to find a solution to deal with the market failure at the core of price discrimination, aiming to protect what apparently should be the goal for EU competition policy.

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[42]   Rosa-Branca Esteves & Joana Resende, 'Personalized pricing and advertising: Who are the winners?' (2019) < https://www.sciencedirect.com/science/article/pii/S0167718718301061> accessed May 17, 2022.

Nowadays, platforms, Big Data, online shopping, and online advertisement have changed how we see asymmetric information, turning Big Data into a significant element to be considered. Big Data does not level the playing field between buyers and sellers with respect the information that one party has from the other. It seems it increases the advantage for the sellers by diminishing asymmetric information mainly for one side (seller side), making the market failure of asymmetric information prevail.

Data is considered to be the "new oil of the internet and the new currency of the digital world".[43] It is used by companies to create more economic value, provide more precise and personal services for users, and predict social needs, which enhance timely innovation and development. When using data in the right way, it may increase economic efficiency. However, it can create new forms of consumer harm (e.g., price discrimination) due to the increased use of unregulated Big Data.[44]

Almost every action taken online by consumers generates data, which is then collected into datasets by companies specialized in tracking – mostly invited by the owner of the respective website- who follow users across the whole web just to sell the generated user profiles to online advertisers, who then offer advertisement services to companies offering products and services.[45]

As it will be further explained, the information obtained by companies every time we use the internet, a smartphone, tablet or any other device or platform that generates data, is huge and incredibly relevant for purposes of what we see on the internet, how advertising guide our behavior and finally, the prices that we pay when we engage on e-commerce. By having access to all this information, the knowledge that the companies have regarding our habits, behaviors, preferences, needs, etc., increases a lot, diminishing the *information asymmetry* only from one side (supplier), allowing companies to acknowledge our

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[43]   Hill, Kashmir, 'Would Monetizing Our Personal Data Ease Privacy Concerns?' (2010), <https://www.forbes.com/sites/kashmirhill/2010/09/20/would-monetizing-our-personal-data-ease-privacy-concerns/?sh=6531e3e11bc4> accessed May 9, 2022.
[44]   Péter Torma, 'Big Data as way to discriminate prices' (2016), <https://www.secjure.nl/2016/01/08/big-data-as-a-way-to-price-discriminate/#_edn7> accessed May 9, 2022.
[45]   ibid.

willingness to pay and making perfect price discrimination something feasible. Hence, Big Data has become the driver for firms to steal consumer surplus and boost the market failure of asymmetric information.

In order to be able to tackle such market failure, we have to understand what Big Data is, how it works, and what firms get from it.

II.A   THE CONCEPT OF BIG DATA

The term 'Big Data' is used for different purposes and does not have an agreed definition. It is usually referred to as the ability to gather large volumes of data, often from multiple sources, and with it produce new kinds of observations, measurements, and predictions.[46]

Karen Yeung (2017) defines Big Data it as the combination of a technology consisting of a configuration of information-processing hardware capable of sifting, sorting, and interrogating data, with a process involving mining data for patterns and using these to make predictive analytics and applying the analytics to new data.[47]

Considering the absence of a universally accepted definition, Big Data is usually described by reference to key characteristics which distinguish it from other collections of data. Most descriptions incorporate the three "v" characteristics: volume of data, the velocity (meaning the speed) with which it is being produced, and the variety of sources and types. Some commentators suggest additional characteristics for Big Data, such as variability (the peaks and troughs in data flow) and complexity (the challenges of making sense of the data).[48]

For instance, simply put, Big Data can be described as a value chain comprised of four basic stages: data collection; data storage and aggregation; data analysis; and use of the results. There are many and different companies engaged in each step of the value of chain. Major players include: search engines; hardware, software and operating system vendors; social networks; retailers; data brokers; advertising networks.[49]

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[46]   Executive Office of the President of the United States (n 8).

[47]   Karen Yeung, 'Hypernudge: Big Data as a mode of regulation by design, Information, Communication & Society' (2017), DOI: 10.1080/1369118X.2016.1186713 <https://www.tandfonline.com/doi/full/10.1080/1369118X.2016.1186713> accessed February 17, 2022.

[48]   Nancy J. King and Jay Forder, 'Data analytics and consumer profiling: Finding appropriate privacy principles for discovered data' (2016), <https://www.sciencedirect.com/science/article/pii/S0267364916300802> accessed May 16, 2022.

[49]   ibid.

II.a.1   STEP 1 – DATA COLLECTION

So, the first step is to collect data. Data is collected from a wide variety of online and offline sources. Online data is collected via cookies, which are placed on a wide variety of websites by third-party data brokers, often with the goal of profiling consumers.[50] Offline data is collected through any other means and then captured in digital form.

Sources of large quantities of consumer data available in Big Data include secondary sources of data which have not been collected directly from consumers or may have been collected for other purposes. Examples of secondary sources of data include: data collected from the government (for example, federal census data about the demographics of people living in certain city blocks including ethnicity, age, education level and occupations); data collected from other publicly available sources (for example, data obtained by crawling social media and blogs); and data collected from other businesses that sell or share consumer data.[51]

For example, when an Internet user visits a website, the owner of the site may place a file called a "cookie" onto the user's computer, enabling the site to keep track of information about the user's interactions with the site. A cookie is a small text file that a website can place on a user's computer. Each time a user loads a particular website, the cookie is sent to that site. This allows websites to "remember" certain information, such as what pages a user has already visited, or whether they are currently logged in to the site. Internet browsers generally allow users to set various permissions that control whether cookies are allowed on their computer. A test by one Internet Service Provider (ISP) found that 96% to 97% of its users allow some cookies and 85%-90% percent allow third-party cookies.[52]

Over time, cookies can be used to build a long-term picture of an individual's Internet browsing history, and that information can be shared across sites. It is even easier to track customer behaviors on websites or mobile applications that require users to create an account and log into that account with each use. Account holders not only perform online tracking, but also typically provide personal information that a site can use to link them with other external information sources.[53]

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[50]   Nico Neumann, Catherine E. Tucker, Timothy Whitfield, 'Frontiers: How Effective Is Third-Party Consumer Profiling? Evidence from Field Studies.' (2019). <https://doi.org/10.1287/mksc.2019.1188> accessed May 9, 2022.
[51]   Nancy J. King and Jay Forder (n 48).
[52]   Executive Office of the President of the United States (n 8).
[53]   ibid.

II.A.2   STEP 2 – DATA STORAGE AND AGGREGATION

The second step is to store and aggregate the data collected. This step is usually made by data brokers. Data brokers are one type of key businesses involved in Big Data that may obtain consumer data from secondary sources like other businesses or governments, as opposed to collecting the data directly from consumers.[54] Data brokers synthesize consumer browsing information and data collected through other sources into user profiles.[55]

II.A.3   STEP 3 – DATA ANALYSIS

After the data is aggregated, we enter the analysis step. Machine learning and Big Data analytics tools are applied to make inferences about consumers. For example, a person could be identified as female by whether that user profile had browsed beauty or makeup websites. Age could similarly be inferred by whether that user profile had previously browsed retirement websites.[56]

The use of computer algorithms, described as sequences of steps and instructions that can be applied to datasets, is a key characteristic of data analytics. Personal data can be inferred from the analysis and processing of the data collected, but also, personal data may be derived from the different sets of information. It is even possible to identify the identity of individuals based on non-personal data that aggregated to a dataset.[57]

Based on the specifics of each consumer, such as age, location, gender, buying habits, among others, consumers are "profiled" so that advertisers can offer specific ads. Based on their habits, consumers get associated with categories or groups, depending on how Big Data algorithms categorize them.[58]

These consumer profiles produced are not limited to compilations of factual information about consumers that has been collected from consumers during their direct interactions with companies. Instead, Big Data facilitates construction of consumer profiles to include

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[54]   Nancy J. King and Jay Forder (n 48).
[55]   Nico Neumann, et al. (n 50).
[56]   Nico Neumann, et al. (n 50).
[57]   Nancy J. King and Jay Forder (n 48).
[58]   Nathan Newman, 'How Big Data Enables Economic Harm to Consumers, Especially to Low-Income and Other Vulnerable Sectors of the Population' (2014), <https://www.huffpost.com/entry/how-big-data-enables-econ_b_5820202> accessed May 9, 2022.

other personal data that has been derived or inferred through data analytics, the so called "fruits" of data analytics.[59]

This process allows the creation of predefined audiences, such as "shoes interested," or "female 30–35." The resulting third party prepackaged audiences are sold to advertisers to allow targeting digital ads to new consumers with whom an organization has no relationship yet and, hence, has no data. For example, 90% of the 500 top websites sent information about their visitors to at least one third party in 2016.[60]

Big Data goes even one step ahead. It not only categorizes consumers based on their profiles, but makes possible to obtain information for each person, based on individual preferences and behaviors.

Also, data collected processed with artificial intelligence techniques can be used to create a variety of different applications on different sectors, such as speech recognition devices, or techniques to suggest what movie you may like on a streaming platform, what songs to recommend on Spotify or what videos suggest in YouTube. While there are several artificial intelligence techniques, they are distinguished into two macro-categories: supervised and unsupervised learning. The main difference is that a supervised algorithm is fed by a large amount of data and learns a specific task you ask for. In other words, you provide data classified into variables and you ask the algorithm to identify the value related to a specific variable. In unsupervised learning, you do not ask the algorithm to find something in particular but allow the algorithm to learn completely on its own. In unsupervised learning, the algorithm looks for identifying rules or associations from data and there is no prior training or exploration phases.[61]

II.A.4   STEP 4 – USE OF DATA

Consumer profiles (categorized and individualized) may be used by companies for several commercial purposes. It allows companies to understand the customer to design products and services that deliver more value to the individual consumer. This information can also be used for online and mobile marketing, as it allows personalized targeted marketing and

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59   Nancy J. King and Jay Forder (n 48).
60   Nico Neumann, et al. (n 50).
61   Giovanna Massarotto & Ashwin Ittoo, 'Can We Teach Antitrust to an Algorithm?' (2021), <https://www.competitionpolicyinternational.com/wp-content/uploads/2021/03/North-America-Column-March-2021-Full.pdf> accessed June 12, 2022.

online behavioral advertising. Big data has lowered the costs of collecting customer-level information, making it easier for sellers to identify new customer segments and to target those populations with customized marketing and pricing plans.[62]

Consumer profiling enables companies to provide personalization of digital systems and devices for consumers, such as personalized shopping experiences. Many companies are involved in using consumer profiling for commercial purposes, including search engine providers, hardware, software and operating systems vendors, social networks, advertisers, retailers, consumer credit companies, and service providers such as telephone providers, and health services companies.[63]

But why is it so attractive to companies to provide personalized shopping experiences and targeted marketing? Research shows that unplanned purchases account for up to 60% of all purchases and that impulse buys can account for anywhere from 40% to 80% of purchases, depending on product category. Impulse buying temptation mainly occurs due to sensory contact, for example, marketing stimuli and visual proximity of product. Hence, when people make an impulse buy, they are often yielding to temptation.[64]

A proper use of the data collected and analyzed not allows retails and companies to benefit and influence consumers who are predisposed to impulse buying, but also helps them to make individualized marketing for those searching for specific products. While initially the informative view of advertising claimed that the primary role of advertising was to transmit information to otherwise uninformed consumers, it seems Big Data is enabling new features for companies.

Companies like Google and Facebook, both of which sell targeted marketing opportunities, have the ability to place ads that will be targeted to a specific audience (groups and individuals) based on their personal characteristics. This has fostered a growing industry of data brokers and information intermediaries that buy and sell customer lists and other data used by marketers to assemble a digital profile of individual consumers. Given sufficient data, sellers can try to predict how buyers will behave in response to different prices and pricing schemes.[65]

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[62]   Executive Office of the President of the United States (n 8).
[63]   Nancy J. King and Jay Forder (n 48).
[64]   Clinton Amos, Gary R. Holmes, William C. Keneson, 'A meta-analysis of consumer impulse buying' (2013), < https://www.sciencedirect.com/science/article/pii/S096969891300115X > accessed May 16, 2022.
[65]   Executive Office of the President of the United States (n 8).

Chapter III below will analyze and explain the new features enables by Bid Data. We will analyze the link between targeted advertising and individualized pricing and how this facilitates perfect price discrimination. It will also be discussed how that where advertisers know consumers' willingness to pay, many consumers end up paying twice as much as others for the same product.

CHAPTER III

TARGETED ADVERTISING AND INDIVIDUALIZED PRICING

Data collected, analyzed, and processed through social media with the help of Big Data Analytic tools allows sellers to understand buyers' insights, learning about their behaviors, habits, and preferences.[66] Big Data analytics and processes, as described above, are making advertising markets to have several deep and fast changes. While advertising strategies were mostly tailored to mass audiences, nowadays companies are enabled to use targeted advertising technologies which allow firms to target their message to groups or individuals, changing their pricing strategies as well. This not only minimize wasted advertising, but also increases firms' ability to send more accurate advertising messages according at individual needs and preferences, even from time-to-time.[67]

Most daily decisions do not occur through a conscious deliberation, but rather, they occur subconsciously, passively, and unreflectively.[68] Bringing this to the modern era of the internet, Big Data, and nudges explained in the previous chapter, means that our decisions can be influenced by what we see when we try to search for something on the internet, or even worse when we are not even looking for it.

Let's consider how Google or other search engines work. We type a query or search for a specific product or service, and, through the Big Data techniques the search engine process millions of information and possible results in less than a second and display what it considers the most relevant results by the relevance considered by the algorithm.[69] In the Google search engine, for example, the first results are sponsored while the followed links are ranked based on the outcome of Google's algorithm.[70]

According to Google's website, the relevance of results is determined by hundreds of factors, including previous searches, and considers the user experience in choosing and ranking results. Although Google results may show 100 pages of results, users would likely

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[66]   Aoun Barakat, Karine & Sayegh, May (n 27).

[67]   Rosa-Branca Esteves & Joana Resende, 'Competitive Targeted Advertising with Price Discrimination' (2016) < https://ideas.repec.org/p/nip/nipewp/08-2011.html> accessed May 17, 2022.

[68]   Kahneman, D., *Thinking, fast and slow* (New York, NY: Farrer, Strauss and Giroux, 2013).

[69]   Google, '*The basics of how Search works*', <https://developers.google.com/search/docs/basics/how-search-works> accessed April 18, 2022.

[70]   Google, 'Advanced: How Search Works', <https://developers.google.com/search/docs/advanced/guidelines/how-search-works> accessed April 18, 2022.

only visit the first page or two.[71] Therefore, the factors used by Google's algorithm and what they consider as a user experience can indeed affect the user's behavior.

This is not limited to Google. The advertisements we find on Facebook and Instagram, or the list of results we find in Amazon operate in a similar way. These platforms also use algorithmic selection optimization techniques that operate as Google's search engine, while earning a significant part of their revenue through selling targeted marketing opportunities. This ability to place targeted ads to specific users based on personal habits, preferences, and characteristics is becoming increasingly valuable to companies.

Nowadays, it is demonstrated that advertising strategies are affected by firms being able to target pricing and therefore, charge individualized pricing and by doing so, engaging in perfect price discrimination.[72] Therefore, considering the significant increase of data driven markets, online advertising, and e-commerce, it is of the essence that we understand the link between targeted advertising and individualized pricing (i.e., perfect price discrimination).

III.A   LINK BETWEEN TARGETED ADVERTISING AND INDIVIDUALIZED PRICING

Initially, targeted advertising allowed firms to advertise more to consumers who have a strong preference for their product than to comparison shoppers who can be attracted to the competition. This allowed firms to eliminate "wasted" advertising to consumers whose preferences do not match a product's attributes and therefore, increasing equilibrium profits.[73] As described in the previous chapter, Big Data analytics and processes allow firms to send accurate advertising messages according at individual needs and preferences, even from time-to-time. Therefore, apart from its informative role, advertising might be used by firms as a price discrimination tool.[74]

Behavioral targeting and personalized pricing use customer-specific information to target advertisements or tailor prices for a set of products. While this kind of personalization required a human to negotiate the price of each product, nowadays, with big data and electronic commerce, the costs became lower, and efficiency of targeting and first-degree price discrimination increased. Firms may now easily design real-time pricing strategies in

[71]   Frank Pasquale, 'Rankings, Reductionism, and Responsibility', 54 Clev. St. L. Rev. 115 (2006) <https://engagedscholarship.csuohio.edu/clevstlrev/vol54/iss1/7> accessed April 15, 2022, page 115–138.

[72]   Ganesh Iyer, David Soberman, J. Miguel Villas-Boas, 'The Targeting of Advertising' (2005) <http://dx.doi.org/10.1287/mksc.1050.0117> accessed June 3, 2022.

[73]   ibid.

[74]   Rosa-Branca Esteves & Joana Resende (2016) (n 67).

which consumers get special pricing and other sale characteristics depending on their location via mapping software, their browser and search history, whom and what they "like" on social networks, the songs and videos they have streamed, their retail purchase history, the contents of their online reviews and blog posts.[75]

These Algorithmic decision-guidance techniques are used to affect the freedom of an individual in the context of decision-making. This is used to shape the information that is available to a user, to focus its attention (and consequently, its decision) on the directions preferred by the "choice architect".[76] These techniques rely upon the use of a nudge: "a particular form of choice architecture that alters people's behavior in a predictable way without forbidding any options or significantly changing their economic incentive".[77]

This allows platforms to understand the habits, preferences, and interests of specific individuals from time to time and use these nudges to guide the user towards the direction preferred by the architect of the nudge.[78] The knowledge obtained through these tools allows sellers and advertisers to offer goods or services at different prices, to extract the maximum price from each individual consumer. Such online price discrimination raises prices overall for consumers.[79]

Big Data platforms facilitate advertisers engaging in user profiling that aids those companies in extracting the maximum profit possible from consumers in the overall economy. This allows advertisers to deliver ads not just to the users most likely to be interested in the product but can also tailor prices for individual consumers in ways that can maximize the revenue extracted from each purchaser. Consumers can be profiled and offered higher prices, unaware that other customers are getting better deals.[80]

One of the many questions raised by Big Data is whether companies will use the information they gather to charge different prices more effectively to different customers and engage in perfect price discrimination. There have been analytical studies and research on online advertising that explain the consumer loss due to price discrimination combined with consumer profiling to help us answer this question.

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[75]   Rosa-Branca Esteves & Joana Resende (2019) (n 42).
[76]   Karen Yeung (n 47).
[77]   Thaler, R., & Sunstein, C., *Nudge* (Penguin Books, 2009), page 8.
[78]   Karen Yeung (n 47).
[79]   Nathan Newman (n 58).
[80]   Nathan Newman (n 58).

III.B ANALYTICAL RESEARCH ABOUT INDIVIDUALIZED PRICING

Research shows that average prices with mass advertising were lower than with targeted online advertising. It has been also found that, where advertisers know consumers' willingness to pay, many consumers end up paying twice as much as others for the same product. The outcome not only has an impact on raising prices overall but also on boosting industry profits, making this more attractive to firms. It also helps to 'steal' customers from competitors (customer poaching), by offering better pricing or sale conditions. Evidence shows that based on customer recognition, a firm charge on average lower prices to its competitor's customers that to its own customers.[81]

Comparing traditional regimes of mass-market advertising to online advertising, researchers Rosa-Branc Esteves and Joana Resende found that average prices with mass advertising were lower than with targeted online advertising. They investigated firms' advertising and pricing decisions when firms have the possibility to target ads to specific segments of the market and therefore, firms may use advertising strategies as a tool for price discrimination. Their study shows with numerical examples that targeted advertising and price discrimination can boost industry profit at the expense of social welfare and consumer welfare.[82]

In a second and more recent study, Rosa-Branc Esteves and Joana Resende analyzed what are the price and welfare effects of personalized pricing through targeted advertising in comparison to mass advertising and pricing. They questioned whether firms could sustain higher prices and obtain greater profits by combining personalized ads with price discrimination strategies and if consumers benefit from targeted ads with personalized price offers.

They found that while the overall welfare effects of the personalized strategy are ambiguous, even when the personalized strategy boosts overall welfare, consumers might all be worse-off. This leads them to the fact that firm's ability to adopt personalized strategies to boost profits at the expense of consumers should be a competition concern. They found that, in comparison to mass advertising and uniform pricing, expected profits can be higher when firms employ a strategy of targeted advertising with personalized

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[81]   Rosa-Branca Esteves & Joana Resende (2016) (n 67).
[82]   ibid.

pricing offers. In particular, when advertising costs are low enough, the ability to price discriminate allows firms to set higher prices and boost their profits.[83]

Rosa-Branc Esteves and Joana Resende concluded that the presumption that markets are competitive is not a sufficient condition to avoid anti-trust concerns raised by price discrimination through targeted advertising. Besides, especially regarding consumer and total welfare, they concluded that it is not possible to make general predictions regarding the welfare effects of price discrimination through targeted ads since the expected welfare may either increase or go down when firms move from a set-up with mass communication (mass advertising/uniform pricing) to a set-up with personalized communication (targeted advertising/ price discrimination). However, they noted that even if welfare goes up when firms use targeted advertising and individualized pricing, firms may be the only ones benefiting from this strategy, while consumers end up being worse-off than in the case of mass advertising and uniform pricing.[84]

A 2014 study made by Benjamin Shiller estimates the increase in profits if Netflix is when the company can use behavioral data and engage in perfect price discrimination. Shiller found that differential pricing based on demographics (whereby Netflix would adjust prices based on a customer's race, age, income, geographic location, and family size) could increase profit by only 0.8%. Is Netflix use 5,000 web browsing variables available (such as the amount of time a user typically spends online or whether she has recently visited competitors) could increase profits by as much as 12.2%. This increase will have a direct impact on consumers, as Schiller found that the estimated range of prices offered to different individuals for use of the same product is quite large.[85]

The research and studies referred above support that where firms know consumers' willingness to pay different prices, they can use price discrimination to increase profits and raise prices overall, with many consumers paying twice as much as others for the same product.[86] Non-experimental tools and techniques for predicting consumer behavior are also evolving rapidly. Predictive modeling is not a simple problem. However, companies have large incentives to refine these tools, since even small improvements can have a large impact on profitability, particularly for companies with a large customer base.[87]

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[83]   Rosa-Branca Esteves & Joana Resende (2019) (n 42).
[84]   ibid.
[85]   Shiller (n 1).
[86]   Rosa-Branca Esteves & Joana Resende (2019) (n 41).
[87]   Executive Office of the President of the United States (n 8).

The link between Big Data, targeted advertising, individualized pricing / perfect price discrimination seems to be clear. It is also evident that it is profitable for companies to engage in perfect price discrimination due to the significant increase in profits that this could mean. Besides, the way in which the profit is made is by stealing all consumer surplus, which is the treasure to be protected by Competition Authorities around the world.

It should be taken into consideration that there are certain challenges involved before a firm can engage in price discrimination. First, sellers should acknowledge customers willingness to pay, which can be a complex problem, even for companies with lots of data. Second, competitors may limit the ability to charge higher prices, even if a firm knows that one customer might be willing to pay more than another. Third, companies need to prevent resale by customers seeking to exploit price differences. Fourth, firms should take care about reputational damages if consumers find that they are being charged different prices for the same products as they may consider this pricing tactic as inherently unfair.[88]

III.C THE BIG TECH COMPANIES

If we are dealing with online advertising, platforms, e-commerce, and related markets, it is hard not to talk about the big tech. The 'Big Five' tech companies is a term which usually refers to Amazon, Apple, Alphabet (Google), Microsoft and Meta (previously, Facebook). Competition authorities around the world, including the European Union and the United States of America are concerned about their market power and its negative effects.[89]

Why are these companies so relevant? In 2021, the Big Five tech companies generated more than USD $1.4 trillion in revenue. That's more than Mexico's entire gross domestic product (GDP). While Apple, Microsoft and Apple are mainly engaged in the service of selling products or providing services, Google and Meta sell *you* as the product to advertisers, selling advertising services. Nearly 98% of Meta's revenue comes from ads in social media, and 81% of Google's revenue comes from advertising on various Google products. The revenue obtained in 2021 from Google and Meta only with respect to advertising services amounts to USD $217.5 billion and USD $114.9 billion, respectively. Google has an estimated

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88   Executive Office of the President of the United States (n 8).

89   Gerbrandy, Anna, 'Shaping competition policy in the era of digitalization': Conceptualizing Big Tech as   Modern   Bigness',   available   at: <https://ec.europa.eu/competition/information/digitisation_2018/contributions/anna_gerbrandy.pdf> accessed February 17, 2022.

market share of 86% in search engine, while Meta owns three of the top four social media platforms (of course, Google owns the fourth one).[90]

Having said that, it is clear that these companies influence what happens on the online world. Specially, with respect to advertisement. As we previously discussed, there is a direct link between the data collected, the algorithm use, the number of users on each network, and the advertising services with then relates with perfect price discrimination. Therefore, if there are few players in the market, it becomes even more relevant to understand how this works.

Over 70% of the all-internet traffic goes through websites owned by Google and Meta. Some scholars argue that Meta and Google should be regulated as public utilities as, by controlling how their infrastructure is designed and operated, these two companies shape the content and character of the digital public sphere, concentrating economic, social, and political power.[91]

Meta and Google deploy machine learning algorithms to order content created by news organizations and social media users and to rank websites and advertisements relevant to different search queries. For every search we make in Google, there may be billions of websites available. Google uses machine learning algorithms to order these websites, ranking them from most to least relevant to your search query and your profile. Meta does something similar on your News Feed. This becomes relevant considering that only Google, processes 3.5 billion searches a day.[92]

According to one study, 95% of web traffic goes to the first page of search engine results, 33% to the first search result and 18% to the second. Therefore, as. Meta and Google set their own standards for ranking and ordering content, refining their personalized ranking algorithms to keep people engaged and to maximize returns, they basically determine what they want a user to see and which websites to visit.[93]

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[90]   Carmen Ang, 'How Do Big Tech Giants Make Their Billions?' (2022) <https://www.visualcapitalist.com/how-big-tech-makes-their-billions-2022/#:~:text=In%202021%2C%20the%20Big%20Five,combined%20%241.4%20trillion%20in%20revenue> accessed June 23, 2022.
[91]   Josh Simons and Dipayan Ghosh, 'Utilities for Democracy: Why and How the Algorithmic Infrastructure of Facebook and Google must be Regulated' (2020) <https://www.brookings.edu/wp-content/uploads/2020/08/Simons-Ghosh_Utilities-for-Democracy_PDF.pdf> accessed June 12, 2022.
[92]   ibid.
[93]   ibid.

How does this work in advertisement? Facebook and Google distribute advertisements among billions of people. As previously explained, their business mostly depends on revenue from this digital advertising. What makes their advertising systems attractive to businesses is the accuracy with which powerful machine learning algorithms can predict which ads are most relevant to which users. The ads that each user sees are not determined by the companies who create ads (e.g., retailers), but by how Meta and Google design the machine learning algorithms within their advertising system.[94]

On a similar way, big tech company Amazon plays a significant role for how retailers commercialize their products and the prices they set. Amazon has a dual role as a platform: (i) it sells products on its website as a retailer; and (ii) it provides a marketplace where independent sellers can sell products directly to consumers.

The A9 Algorithm is the system which Amazon uses to decide how products are ranked in search results. It is similar to the algorithm which Google uses for its search results. It considers keywords in deciding which results are most relevant to the search and therefore which it will display first. However, there is one key difference between Google and Amazon's algorithms: the A9 Algorithm also puts a strong emphasis on sales conversions. This is because Amazon's business is a marketplace and therefore, it has a vested interest in promoting listings which are more likely to result in sales. Therefore, Amazon will rank listings with a strong sales history and high conversion rate more highly. This is the part where the specifics of each user become relevant: what product, from which provider, and that price, is the user willing to buy? That is the product that Amazon will encourage you to buy.[95]

The size of these companies and the influence they have on shaping the markets in which they are involved is not something common. The structure of these markets, the behavior of the players and the rules of the fame have caught the attention of almost all relevant competition authorities around the world for several reasons. For example, Google has been fined with more than 4 billion euros by the EU for abusing of dominance position. In addition, in March 2022, the European Commission has opened a formal antitrust

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[94]   ibid.

[95]   Seamus Breslin, 'Everything You Need To Know About Amazon's A9 Algorithm' (2022) <https://www.repricerexpress.com/amazons-algorithm-a9/> accessed June 12, 2022.

investigation to assess whether an agreement between Google and Meta for online display advertising services may have breached EU competition rules.[96]

Likewise, in November 2020, the European Commission sent a Statement of Objections to Amazon as it considered it has breached EU antitrust rules by systematically relying on non-public business data of independent sellers who sell on Amazon's marketplace, to the benefit of Amazon's own retail business, which directly competes with those third-party sellers. The Commission also opened a second formal antitrust investigation into the possible preferential treatment of Amazon's own retail offers and those of marketplace sellers that use Amazon's logistics and delivery services.[97]

As we will further discuss in the next chapter, the fact that there are these dominant players in the market makes it even easier for firms to engage in price discrimination. However, it is of the essence to make a clear distinction in the distribution chain. While this big tech companies offer advertisement services or a marketplace, the entity that would engage in price discrimination is the one that is setting the individualized price and making the sale itself. This seller firm indeed require the services of data collectors, data brokers, algorithms, advertisement services, etc., which could be provided by these big tech companies. However, these advertisers or marketplaces are the ones engaging in price discrimination when a sale with individualized pricing is made.

Therefore, the current asymmetric regulation or investigations which target their market power and abuse of dominance would likely not tackle the perfect price discrimination issue that we have been describing throughout this thesis. The main reason is that there is a discrepancy between market failures to be addressed. While the current competition law and asymmetric regulation aims to deal with and regulate the market failure of market power, the legal framework does not tackle the market failure of asymmetric information, which gives raise to perfect price discrimination.

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[96] European Commission, 'Antitrust: Commission opens investigation into possible anticompetitive conduct by Google and Meta, in online display advertising' (2022) <https://ec.europa.eu/commission/presscorner/detail/en/ip_22_1703> accessed June 23, 2022.

[97] European Commission, 'Antitrust: Commission sends Statement of Objections to Amazon for the use of non-public independent seller data and opens second investigation into its e-commerce business practices' (2020) <https://ec.europa.eu/commission/presscorner/detail/en/ip_20_2077> accessed June 12, 2022.

CHAPTER IV
WHY AND HOW TO REGULATE PERFECT PRICE DISCRIMINATION IN THE ERA OF BIG DATA

Previous chapters raised the issue of how perfect price discrimination allows firms to steal consumers' welfare and transfer it into producers' profit. We analyzed that while price discrimination is foreseen in the competition legal framework, it is difficult to catch under the current rules and case law, as it will only be sanctioned if it complies with certain requirements, including the engagement by a dominant firm and if the conduct has the effect of placing market players at a competitive disadvantage.

While consumer surplus maximization is intended to be (and should be) seen as a goal for EU competition policy, it seems the current legal framework does not protect consumers from perfect price discrimination. The market failure at the core of perfect price discrimination (i.e., asymmetric information) is different from the market failure that is targeted by competition law or, at least, specifically by 102 (c) TFEU (i.e., market power).

Moreover, it has been explained that Big Data Analytic tools allows sellers to understand buyers' insights, learn about their behaviors, habits, and preferences, allowing firms to charge individualized prices to each consumer, engaging in first-degree price discrimination.[98] Analytical studies mentioned along this thesis evidence that where firms know consumers' willingness to pay different prices, they can use price discrimination to increase profits and raise prices overall.[99]

IV.A WHY REGULATE PERFECT PRICE DISCRIMINATION

The dominant view in recent years has been that the risk of over-enforcement is greater than the risks of under-enforcement.[100] The main risk of over-enforcement is to harm innovation. Proper competition law and its enforcement is a key component to create and enhance innovation and it is important to identify how lawmakers and enforcement agencies can ensure that competition law supports, rather than impairs, the operation of free markets.[101]

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[98]   Aoun Barakat, Karine & Sayegh (n 27).
[99]   Rosa-Branca Esteves & Joana Resende (2019) (n 42).
[100]   Josh Simons and Dipayan Ghosh (n 91).
[101]   Roger Alford, 'The Role of Antitrust in Promoting Innovation' (2018) <https://www.justice.gov/opa/speech/file/1038596/download> accessed June 13, 2022.

However, this view is based on widely discredited economic theory that cartels are unstable, that business practices in normal competitive markets do not harm competition, and that markets eventually always self-correct. The dominant view does not incorporate the risks of under-enforcement in industries of fundamental social and political, as well as economic, activity, as in case of internet platforms, e-commerce and new emerging technological markets.[102]

There is no doubt that digitalization, including the aggregation and commercial use of large quantities of data, has created a multitude of dynamic product offerings that deliver incredible benefits to consumers. It enhanced innovation and created different products, markets and services around the globe in the benefit of consumers and companies. But, as the Deputy Assistant Attorney General of the Antitrust Division of the U.S. Department of Justice said, "there is no reason to think that the lessons we have learned over the past several decades about the role of antitrust enforcement in protecting and respecting innovation do not apply to the digital marketplace". Quite the opposite: there is a strong case to be made that years of consistent application of antitrust law, with innovation as a key concern, fueled the growth of digital companies in the first place.[103]

The competition legal framework, asymmetric regulation and / or investigations made by the European Commission target market power and its abuse as the top market failure to tackle. Leaving aside the market failure of asymmetric information is leaving helpless the consumer welfare by allowing firms to continue engaging in perfect price discrimination through Big Data.

Competition and regulation are often regarded as substitutes and that is why the main '*Competition where possible, regulation where necessary*' has so many merits when approaching industries. The primary rationale for regulation, along with public policy goals, is to remedy a market failure. Regulation is required- and only required- in the face of some market failure. When a market failure has causes other than market power, regulation can be a prerequisite for there to be effective competition and a proper function in the market.[104]

In devising any regulatory framework, it is necessary to begin by asking how or why markets failed. The market failure will provide the rationale for the introduction of

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102   Josh Simons and Dipayan Ghosh (n 91).
103   Roger Alford (n 101).
104   Kay, John and John Vickers, *Regulatory reform: An appraisal* (European University Institute, 1988).

regulation. It follows then that each regulatory regime should be targeted on the relevant failure or failures.[105]

To delimit the use of Big Data merely because it causes some users negative experiences on one hand would reduce welfare, and on the other would be unfair, since "it forces those with relatively good attributes to subsidize both those with bad attributes and those with extreme preferences for privacy".[106] However, commercial applications of Big Data deserve ongoing scrutiny given the speed at which both the technology and business practices are evolving and the different type of uses that it can be given to the data collected and processed, such as price discrimination.[107] Online advertising market exploded and has become the largest advertising sector. The result of the swift technological development is a new, continuously expanding range of tools to utilize the big amount of data.[108]

The emerging trend of ex-ante regulation seems to be the consequence of a failing enforcement of ex-post competition rules, mainly in the digital reality where things move so fast. Ex-post investigations and process are usually characterized by slow and complex procedures followed by litigation against courts several years after. Drafting and shaping well-functioning, contestable, fair, and healthy digital advertising markets must be done via proactive—not just protective—regulatory visions.[109]

IV.A.1 CURRENT DIGITAL REGULATION

In the last decade, since the boost of the digital transformation, legislative followed a significant number of authoritative reports and studies aiming to explain regulatory issues with respect to the manage of data, digital services, Big Data, big tech companies and related markets. This gave the entrance to remarkable antitrust bills such as the Digital Service Act and Digital Market Act. This trend comes along with a better coordination between different sectoral regulators, Member States and even countries in other countries, as we see similar

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[105]   Kay, John and John Vickers (n 104).
[106]   Péter Torma (n 44).
[107]   Executive Office of the President of the United States (n 8).
[108]   Péter Torma (n 44).
[109]   Oles Andriychuk, 'How Big Media Handed Digital Advertising to Big Tech' (2022) <https://www.law.ox.ac.uk/business-law-blog/blog/2022/06/how-big-media-handed-digital-advertising-big-tech> accessed June 23, 2022.

proactive initiatives aiming at restoring systemic market failures in the UK, Australia, France, and other jurisdictions.[110]

Although the current competition, digital and privacy laws provide a variety of legal methods to tackle the issues resulting from abuse of dominance, wrong use of data, cybersecurity, or even price discrimination in conventional circumstances, there is no current regulation applying to price discrimination if made by non-dominant firms (regardless of the use or none of Big Data).

On March 24, 2022, the EU's institutions reached a political agreement on the Digital Markets Act (DMA). The EU's Vice-President expects the DMA to be fully applicable in October 2022. DMA is aimed at big tech companies which are referred to as "gatekeepers". Articles 5 and 6 of the DMA contain broad obligations and prohibitions applicable to the targeted digital gatekeepers. While these rules intend to create "fairness" in the way gatekeepers will interact with trading partners and "contestability" in the markets within which these gatekeepers operate, some scholars believe that the DMA is undoubtedly an illusion of overregulation, which could generate detrimental consequences on innovation for digital technologies.[111]

The DMA provide for non-discriminatory rules which suggest algorithmic accountability, meaning that enforcers would constantly review the gatekeepers' algorithmic formulas to ascertain the absence of "unfair" or "discriminatory" treatment of business users. From a first look it could seem that this could potentially impact a price discrimination conduct. However, it is not the case. This provision is aimed at avoiding "self-preferring" from gatekeepers. Besides, as we already discussed, perfect price discrimination with the use of big data can be made without the involvement of a "gatekeeper".[112]

In addition to the DMA, we find the Digital Service Act (DSA). The DSA provides for a new standard for the accountability of online platforms regarding illegal and harmful content. It aims to protect internet users and their fundamental rights, as well as defining a unfirm set of rules in the internal market. The DSA provides for a certain degree of accountability for

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[110]   Oles Andriychuk, 'How Big Media Handed Digital Advertising to Big Tech' (2022) <https://www.law.ox.ac.uk/business-law-blog/blog/2022/06/how-big-media-handed-digital-advertising-big-tech> accessed June 23, 2022.
[111]   Aurelien Portuese, 'The Digital Markets Act: The Path to Overregulation' (2022) <https://www.competitionpolicyinternational.com/wp-content/uploads/2022/06/EU-Column-June-2022-2-Full.pdf> accessed June 19, 2022.
[112]   ibid.

online platforms which should be transparent about their content moderation decisions, prevent dangerous disinformation from going viral and avoid unsafe products being offered on marketplaces.[113]

Besides the DMA and the DSA, digital regulation incudes the Data Governance Act (DGA), the Europe Health Data Space (EHDS), the Data Act (DA), the Digital Identify Framework (DIF) and the Artificial Intelligence Act (AIA). Jointly, the digital regulation aims to unlock access to data, ensure trust in the data intermediaries, technologies, and services, as well as promoting fair and contestable digital markets. Most of these apply to all digital players, while the DMA and the DSA are only applicable to large online platforms.

Last but not least, Article 102 TFEU is directed towards unilateral conduct of dominant firms which act in an abusive manner. Hence, price discrimination is deemed as an abusive pricing practice and would only be illegal if it fulfills certain requirements, including the engagement by a dominant firm and if the conduct has the effect of placing market players at a competitive disadvantage.

The lack of regulation applicable to exclusionary and exploitative conducts made by non-dominant firms explains why it is so difficult to catch price discrimination under the current competition legal framework. Besides, the digital regulation focuses on different market failures and left aside this type of conduct, which apparently should be addressed by competition law.

IV.B HOW TO REGULATE PERFECT PRICE DISCRIMINATION

There is a huge debate over technology platforms and regulation that has produced a number of valuable suggestions identifying key goals for policies aiming to regulate anticompetitive conducts related with technological markets and platforms, that are applicable to perfect price discrimination. First, regulation should assure fair access and equal treatment aiming to make sure that first degree price discrimination is forbidden and will be considered illegal for all companies, regardless of their dominance position, market share or characteristics of the specific market. Second, it should assure protection of users, as if there were fiduciary duties from companies with respect to the use of users' data and

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[113]   European Commission, 'Digital Services Act: Commission welcomes political agreement on rules ensuring a safe and accountable online environment' (2022) < https://ec.europa.eu/commission/presscorner/detail/en/IP_22_2545> accessed June 24, 2022.

protection against algorithmic nuisance. Last but not least, regulation should create forms of accountability for platforms.[114]

Doctrine divides regulation into two basic means by which a regulator can influence the behavior of an industry with a market failure: a) regulate the structure of the market, and/or b) regulate the behavior of the market players. Structural regulation means the determination of which firms and/or individuals are allowed to engage in which activities, for example, restrictions to entry, statutory monopoly, single capacity rules, or restrictions to supply. On the other hand, behavioral regulation refers to measures concerned with how firms behave in the market or with respect to a specific activity. The simples form of conduct regulation is the directive, in which the regulator tells the regulated what to do, or what not to do.[115]

Based on the nature of the conduct that we would like to regulate, an ex-ante directive aiming to reach the goals previously described and regulating the behavior of firms would seem to be less invasive and sufficient.

IV.B.1   TO WHICH ENTITIES SHOULD THE REGULATION APPLY

As it was explained in Chapter II above, there are many and different companies engaged in each step of the value of chain of Big Data, including search engines; hardware, software, and operating system vendors; social networks; retailers; data brokers or advertising networks.[116] A relevant question here should be to whom the regulation should apply to avoid perfect price discrimination? Is it to the companies engaged in collecting the data, or those that processed the data and allow firms to identify specifics of each customer or maybe to the retailer that determines the individual pricing or to the company providing the online advertising services?

Having understood how the different types of algorithms of search engines, social networks or marketplaces work, and the influence of these companies to allow price discrimination, it is now important to identify which level of the supply chain should be observed and regulated to avoid such behavior. On the one hand, these big tech companies are the ones that develop the machine learning and algorithms that allow them to identify what each

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114   K. Sabeel Rahman, 'Regulating Informational Infrastructure: Internet Platforms as the New Public Utilities' (2018) <https://papers.ssrn.c om/sol3/papers.cfm?abstract_id=3220737> accessed June 12, 2022.
115   Kay, John and John Vickers (n 104).
116   Nancy J. King and Jay Forder (n 48).

user is looking for, her / his specific characteristics, needs, etc., which together generate her / his "willingness to pay". It is through these algorithms that the companies that will make the sale, *i.e.* retailers, for example, can sell a product at an individualized price.

However, it is not these big tech companies that set the individualized price or determine under which individual characteristics a buyer would acquire a certain product or services at an individualized price. In other words, the seller (*e.g.*, the retailer) or the company that hires the services of Google, Facebook or sells through Amazon is the company that determines the prices and the individualized profile of each user, while the big tech companies are the necessary channel to place the product at the individualized price with the user who is willing to pay for the product at the price previously determined for his own profile and specific characteristics.

Thus, there is an interdependence of both groups of companies to make the sale of the product or offer a service at an individualized price and therefore engage in perfect price discrimination. Although, both have the incentives to do so. On the one hand, sellers want to place the product or service at the maximum price that each user can or is willing to pay, since this maximizes their profits, as described in Chapter I and III above. On the other hand, companies that sell advertising services or marketplaces are interested in their customers (i.e., those who hire their advertising or online sales services) making as many sales as possible, since this increases the effectiveness of their advertising services or marketplace and, therefore, of the company as such.

However, there is an important distinction to make. While tech companies offer targeted advertising, which causes individualized pricing, targeted advertising is not the issue. The algorithm developed and the advance profiling services offered by tech companies allow perfect price discrimination to be made, but they also have several other purposes. Therefore, forbidden targeted advertising would have side effects in related markets that have nothing to do with perfect price discrimination.

Moreover, targeted advertising is not the only channel to engage in perfect price discrimination. As Benjamin Schiller evidenced in his 2014's study, if Netflix uses the proper algorithm and adjust prices based on customer's characteristics, it could increase its profits as much as 12.2%.[117] Therefore, we can conclude that regulating tech companies by prohibiting targeted advertising could create an unnecessary harm without being the only

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[117]   Shiller (n 1).

effective measure that can be taken. While small retailers can benefit from the dominance position of the big tech companies to engage in fist-degree price discrimination, a regulation to one level of the distribution chain should be enough to cut the transfer of negative effects.

To conclude, the proposal for regulation is an ex-ante rule, contained in a directive, whereby perfect price discrimination (i.e., setting individualized pricing based on the characteristic of each user) for e-commerce is forbidden.

CONCLUSIONS

In the past decade price discrimination was relevant solely for dominant firms. It was only considered to be relevant when market power was achieved. Even in that case, thinking about perfect or first-degree price discrimination seemed to be rare or almost impossible considering asymmetric information and lack of information about demand elasticities or the willingness to pay of each user.

Nowadays the story is different. Charging differentiated prices seems to be feasible, profitable, and desired by certain firms. Big data allows algorithm techniques to acknowledge and process the habits, preferences, and interests of specific individuals from time to time and guide users towards the direction preferred by firms. Moreover, market power or dominance is no longer a condition to engage in price discrimination. Having access to the algorithm and platforms of some of the Big Five could be enough.

However, we cannot say this is completely wrong without considering the benefits of this. Increasing output, allocative efficiency, lack of deadweight loss, among others are the benefits of price discrimination. Under first-degree price discrimination by a monopolistic, output and total welfare are the same as under perfect competition (no deadweight loss). Although total welfare would be on the firm's size and nothing on the consumer, economists that are indifferent to welfare allocation would prefer this outcome.[118]

Ultimately, whether differential pricing helps or harms the average consumer depends on how and where it is used. In a competitive market with transparent pricing, the benefits are likely to outweigh the costs. We can see this example in the airline sector, where the Internet has made it relatively easy for consumers to compare prices and itineraries across airlines. Some studies even suggest that differential pricing can intensify competition relative to uniform pricing, by allowing high-margin sellers to compete more aggressively for price-sensitive customers.[119] Providing internet users with information regarding what companies do with the data we provide daily, as well as the impact that this has in our lives could enhance a better consumer choice and promote a more competitive environment in the markets involved.

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[118]   Niels, Jenkins and Kavanagh (2016), *Economics for Competition Lawyers*, Oxford, 2nd edition, page 183.
[119]   Executive Office of the President of the United States. 2015. Big Data and Differential Pricing. https://obamawhitehouse.archives.gov/sites/default/files/whitehouse_files/docs/Big_Data_Report_None mbargo_v2.pdf?utm_source=Bruegel+Updates&utm_campaign=656e7da39b-Blogs+review+11%2F02%2F2017&utm_medium=email&utm_term=0_eb026b984a-656e7da39b-278510293.

Notwithstanding this, most markets are not that transparent and competitive and therefore, consumer's welfare is at risk. While consumer surplus maximization is intended to be (and should be) seen as a goal for competition policy, it seems to be unprotected from perfect price discrimination, unless it complies with the strict requirements provided by the legal framework. The market failure at the core of perfect price discrimination (i.e., asymmetric information) is different from the market failure that is targeted by competition law or, at least, specifically by 102 (c) TFEU (i.e., market power). Hence, as it will be further discussed, regulation might be the proper solution for the problem at hand, which is a market failure discrepancy observed.

Moreover, big tech companies, which are now subject to a burdensome and strict digital regulation environment are indeed part of the issue because of being a perfect bridge between users, their data, retailers, and the transaction itself. However, prohibiting targeted advertising will not fix the problem and could have negative side effects in related markets.

Therefore, there is a market failure that needs to be fixed. The proposal for regulation is an ex-ante rule, contained in a directive, whereby perfect price discrimination (i.e., setting individualized pricing based on the characteristic of each user) for e-commerce is forbidden.

Having said that, the research question of this thesis, consisting in understanding how Big Data allows companies to engage in first-degree price discrimination and why should this be a competition law concern has been answered. We analyzed and understood that Big Data makes feasible and easier to companies, regardless of their market power, to engage in perfect price discrimination and charge higher prices to selected customers. We concluded that perfect price discrimination affects consumer's welfare, which is intended to be seen as a goal for competition policy for the European Commission. Besides, que analyzed the current legal framework and concluded that does not forbid perfect price discrimination for non-dominant firms. Last, but not least, we made an analysis and suggestion of the proper regulation to be implemented.

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