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Why do Competition Authorities need Artificial Intelligence?

EU Competition Law Enforcement

Isabella Lorenzoni*

Abstract

Recent developments in technology are transforming the way antitrust is enforced and the way market players are infringing competition law. As a result, antitrust enforcers are starting to equip themselves with sophisticated digital tools. Interviews with competition authorities have revealed that the use of Artificial Intelligence (AI) for enforcement purposes is still in its infancy, but more and more regulators are looking into expanding their units to develop their own IT expertise. Text mining systems based on Natural Language Processing, sophisticated document management software with pattern recognition features (Machine Learning systems), and digital screening tools in public procurement have already started to appear among tools that regulators might use to enforce competition law. Therefore, we are witnessing a general trend and an interest among Competition Authorities in the process of digitalising their enforcement proceedings. This paper explores this interest in building an AI arsenal for the fight against algorithmic infringements. What are the key factors motivating regulators to develop their own technological equipment to enforce competition law? Are computational tools, such as algorithmic systems, needed in order to fight competition infringements in the digital era? This paper builds on findings from interviews with several competition authorities. Changes in the digital markets, the need for enforcers to reverse-engineering companies' algorithms in order to better understand their implications for competition law, the need to enhance efficiency and keep pace with the fast evolution of the digital economy, and finally the decrease in leniency applications are all reasons for which competition authorities should strive for more innovative and alternative means to boost their *ex officio* investigations.

Keywords:

Artificial Intelligence, Competition law, enforcement, digital economy, digital market

* Isabella Lorenzoni is a doctoral researcher at the University of Luxembourg in Competition Law and Artificial Intelligence within the DILLAN program (Digitalisation Law and Innovation). Email: isabella.lorenzoni@uni.lu. Supported by the Luxembourg National Research Fund PRIDE19/14268506. She holds an LL.M in European Intellectual Property Law (2019-2020) from Stockholm University – Sweden, and a Master's degree in Law (2009-2014) from Pisa University – Italy. She also passed the Italian Bar exam (2018). She worked as a trainee lawyer in Germany and Italy and she was a Blue Book trainee for one year at the European Commission (DG Competition) in Brussels (2020-2021).

I. Introduction

Competition law is not immune to the so-called “fourth industrial revolution” (or AI revolution),¹ as developments in technology are transforming the way antitrust is enforced and the way market players are infringing competition law. In fact, antitrust is not a static domain but it changes within the evolution of society and its economy.² An economy which is nowadays a “digital economy” because of the relevance that Big Data, AI and technologies in general are playing in our daily lives.³

Competition law needs to be adapted and shaped according to the changes in economic dynamics⁴ as “the digitalization of markets requires the adaptation of some rules and mechanisms”.⁵ An example of how digitalization affects competition can be seen in the recent debate about the standard that should be used to enforce antitrust. In the U.S., the dominant Chicago School advocates for “consumer welfare” as the standard for enforcing competition rules. It focuses on “consumer surplus,” understood as the benefits gained from consumption of goods and services.⁶ However, this standard has been lately criticised for being anachronistic, as it does not represent the dynamics and evolution of the modern digital market. Some courts have used the “consumer welfare” standard to assess an infringement of competition law only when there is “an increase in price or reduction in quality”,⁷ which does not necessarily mirror the reality of the digital market, in which goods and services are often provided to consumers free of charges.⁸ An emerging current called the “new Brandeis School”⁹ advocates for a different standard which does not focus only on the outcomes (low prices and efficiency) but also on other aspects.¹⁰ In the digital economy, where the “zero-prices” policy applies to consumers, it is difficult to measure their “surplus” in terms of monetary transaction.¹¹ If it is true that consumers do not disburse money for certain online items,¹² they nevertheless “pay” with their attention and data.¹³ Hence, only focusing on the increase in price does not give justice to the real dynamics of our digital economy, where data, innovation and quality should be the new consumers surplus.¹⁴ At the European Union (EU) level, consumer welfare is not the only paradigm used to enforce competition law, but European Competition Authorities (CAs) use it in a broader way, to also include innovation, quality and choice and not only price.¹⁵

¹ Garikai Chimuka, ‘Impact of Artificial Intelligence on Patent Law. Towards a New Analytical Framework – [the Multi-Level Model]’ (2019) 59 World Patent Information 101926.

² Schrepel Thibault is referring for example to “Antitrust 3.0” which “appeared in the early 2010s when antitrust agencies have shifted their focus on the issues related to the digital economy.” Thibault Schrepel, ‘Computational Antitrust: An Introduction and Research Agenda’ (2021) 1 Stanford Journal of Computational Antitrust, 1 2.

³ Digital revolution affects economy <<https://ec.europa.eu/jrc/en/research-topic/digital-economy>> accessed 7 March 2022. See also Pinar Akman, ‘Competition Policy in a Globalized, Digitalized Economy’ (World Economic Forum White paper 2019), according to which a “truly ‘digital economy’ is one in which businesses from across the industrial spectrum invest in digital capabilities and make the most productive use of them. As digitalization continues to transform the economy, and the line between offline and online businesses further blurs [...]” 5.

⁴ Michael L. Katz and A. Douglas Melamed, ‘Competition law as common law: American express and the evolution of antitrust’ (2020) 168 University of Pennsylvania Law Review 2061 citing *Leegin Creative Leather Prods., Inc. v. PSKS, Inc.*, 551 U.S. 877, 899 (2007) “As the Supreme Court explained in *Leegin*, “[j]ust as the common law adapts to modern understanding and greater experience, so too does the Sherman Act’s prohibition on ‘restraint[s] of trade’ evolve to meet the dynamics of present economic conditions.” 2064.

⁵ Thibault Schrepel, ‘Antitrust Without Romance’ (2020) New York University Journal of Law & Liberty 326.

⁶ Marshall Steinbaum and Maurice E. Stucke, ‘The Effective Competition Standard A New Standard for Antitrust’ (2018) Roosevelt Institute, 15.

⁷ “A ‘prototypical example of antitrust injury’ is that consumers ‘had to pay higher prices (or experienced a reduction in the quality of service) as a result of a defendant’s anticompetitive conduct.’” *Mathias v. Daily News, L.P.*, 152 F. Supp. 2d 465, 478 (S.D.N.Y. 2001) in Steinbaum and Stucke (n 6) 16.

⁸ Akman (n 3).

⁹ <<https://www.pbwt.com/antitrust-update-blog/a-brief-overview-of-the-new-brandeis-school-of-antitrust-law>> accessed 28 March 2022.

¹⁰ Akman (n 3) 7.

¹¹ Akman (n 3).

¹² For instance, consumers do not pay to use WhatsApp or other applications. Steinbaum and Stucke (n 6).

¹³ Akman (n 3).

¹⁴ “[...] to provide courts and agencies greater guidance, we first propose the following effective competition standard: Agencies and courts shall use the preservation of competitive market structures that protect individuals, purchasers, consumers, and producers; preserve opportunities for competitors; promote individual autonomy and well-being; and disperse private power as the principal objective of the federal antitrust laws” Steinbaum and Stucke (n 6) 29.

¹⁵ Akman (n 3) 7.

In order to face the challenges of the digital economy, antitrust enforcers are starting to equip themselves with sophisticated digital tools. Interviews with CAs have revealed that the use of AI for enforcement purposes is still in its infancy, but more and more regulators are looking into expanding their units to develop their own IT expertise. This paper analyses the key factors motivating regulators to develop their own technological equipment to enforce competition law, and whether they are needed in order to fight competition infringements in the digital era. This paper is divided as follows: Section II analyses recent projects of CAs that involve the use of AI and other sophisticated tools, and which is the way forward. Section III analyses the key factors for developing AI enforcement tools. In particular, enhancing efficiency to keep up with evolving technologies, understanding the structure of the digital market and of companies' algorithms, as well as the decrease of leniency applications are among the reasons why CAs should develop their own digital tools for enforcement purpose. Section IV concludes with some final remarks.

II. Chapter 1 A glance inside competition authorities and their AI projects

CAs are starting to look into developing their own in-house digital investigation tools. Some have already developed digital units with AI systems applied to real cases. Others have started to hire IT experts to bring digital knowledge into the agency and help case handlers to understand how competition law enforcement can benefit from digitalisation. Other CAs have projects that they hope to extend to real cases in the near future.

The Italian CA (*Autorità Garante della Concorrenza e del Mercato*) has put in place a pilot project based on data analysis, AI and machine learning (ML) techniques (e.g. classification, clustering and reinforcement learning) to investigate online platforms, such as Amazon, and their ranking algorithms, to detect potential competition issues, such as price discrimination and collusion. The software used is able to investigate the parameters on which Amazon's algorithm decides the winner of the "Buy Box". A web-scraping method was used on a daily basis for a month to collect data of some products in order to create a database. Subsequently, a supervised ML algorithm, "Random Forest", was implemented and the classification model allowed to identify some of the parameters used by Amazon's algorithm to decide the winner of the Buy Box.¹⁶

The Greek CA (Hellenic Competition Commission) has set a Forensic Investigation Detection Unit which has developed its own data collection platform (Data Analytics & Economic Intelligence Platform) that gathers publicly available data from different sources (retail, fuel, vegetables and fruits prices and public procurement data).¹⁷ An algorithmic screening tool with linear regression is also used to compare prices between products on a daily basis, observe important changes, and monitor whether prices of a same product of different firms rise simultaneously over a time series. Both, the screening tool and the platform are mainly used for cartel detection and help the HCC to have a first screening of the market and identify suspicious industries which will be prioritised for beginning an *ex officio* investigation.¹⁸

In 2018, the Spanish CA has created an Economic Intelligent Unit which is in charge to strengthen *ex officio* investigations and detect anticompetitive behaviours, by developing new tools based on data mining, quantitative techniques, forensic analysis that help to identify collusive patterns in the data.¹⁹ "[M]ore complex statistical and econometric techniques, network analysis and machine learning methods, both supervised and unsupervised, are beginning to be applied".²⁰ In particular, due to the possibility of accessing large amount of data, "automated detection tools"²¹ are particular prominent in bid rigging cartel in public procurement.²² The

¹⁶ Antonio Buttà, Andrea Pezzoli, Manuel Razza and Emanuel Weitschek, 'Inferire il funzionamento degli algoritmi nelle piattaforme di e-commerce con il machine learning – aspetti di tutela della concorrenza e del consumatore' (Ital-IA 2022 – Workshop AI per la Pubblica Amministrazione, February 2022).

¹⁷ Ioannis Lianos, 'Computational Competition Law and Economics: Issues, Prospects - An Inception Report' (2021) Hellenic Competition Commission.

¹⁸ Ibid.

¹⁹ <<https://www.cnmc.es/en/ambitos-de-actuacion/competencia/unidad-de-inteligencia-economica>> accessed 27 March 2022.

²⁰ Lynn Robertson, 'Latin American and Caribbean Competition Forum – Session I: Digital Evidence Gathering in Cartel Investigations – Contribution from Spain' (OECD 28–29 September 2020).

²¹ Competition Policy International 'CPI Talks...with Cani Fernández' (CPI 27 September 2020) <<https://www.competitionpolicyinternational.com/cpi-talks-with-cani-fernandez/>> accessed 27 March 2022.

²² Kyriakos Fountoukakos, 'Interview with María Luisa Tierno Centella (CNMC) by Kyriakos Fountoukakos (Herbert Smith Freehills)' (3rd Cartels Workshop: An advanced seminar on substantive and procedural EU developments Workshop I - Substantive Issues, Wednesday 19 January 2022 – Concurrences).

Unit is also in charge of providing investigative tools to face new challenges of the digital reality, for the analysis and detection of behaviours such as algorithmic collusion.²³

Finally, the UK Competition and Markets Authority (CMA) has built since 2018 what is now a fully developed Data, Technology and Analytics (DaTA) Unit with a team of around 50 people among data scientists, lawyers and economists.²⁴ The unit works with data engineering, ML and AI solutions in consumer, merger and antitrust cases to detect clusters of suspicious reviews through network analysis, or natural language processing to review internal documents received from companies. Moreover, this unit helps the CMA to understand how companies' algorithms work and for which purpose they use AI and ML, and how they use the data they collect, in order to infer whether or not the authority should intervene and if any breach of competition or consumer law can be envisaged.²⁵

From the interviews conducted, it has emerged that the aim of most CAs is to expand their digital enforcement tools, but this process in many cases would take time. Among the problems that have been flagged, not having enough data is by far the most challenging one, as it makes AI impossible to use. Also, some CAs do not have enough resources to dedicate to develop in-house AI systems, or not enough cases that would require the use of AI.

III. Chapter 2 Key factors for developing AI enforcement tools

As seen in the previous section, we can grasp a general trend and an interest among CAs to invest in digital technologies and participate in the debate about enforcing competition law in the digital era. Even smaller agencies that have not (yet) developed any digital tools are still participating in working groups within the European Competition Network to learn from the most technological CAs and exchange best practices.²⁶ From the interviews so far conducted, it clearly emerges that most of the CAs aim at expanding their own technological capability in the near future. But why there is this "AI race" among CAs? Which are the factors motivating enforcers to invest in AI? The following section is dedicated to highlight some reasons why enforcers are and *should* explore and take advantage of the new opportunities provided by AI for enforcing competition law.

2.1 Enhancing efficiency

One obvious reason that may incentivise CAs in investing in digital tools is to enhance efficiency, in terms of accuracy of a case analysis and in terms of time. Enforcers are often criticised for their time-consuming investigations,²⁷ which does not go hand in hand with the fast pace at which the digital market moves. In fact, once a CA has reached a decision and before a remedy is ordered, it may be needed to re-examine the market and the case, to see if the economic dynamics of the digital market have already changed.²⁸

Given the increasing computational power, the speed in analysing vast amounts of data, AI systems are well suited to replace and even be better at some administrative tasks.²⁹ AI can enhance efficiency and it is for this

²³ <<https://www.cnmc.es/en/ambitos-de-actuacion/competencia/unidad-de-inteligencia-economica>> accessed 27 March 2022.

²⁴ Helena Quinn, Kate Brand and Stephan Hunt, 'Algorithms: helping competition authorities be cognisant of the harms, build their capabilities and act' (2021) 3 *Artificial Intelligence and Competition Law – Concurrences* 5.

²⁵ Ibid; <<https://competitionandmarkets.blog.gov.uk/2018/10/24/cmas-new-data-unit-exciting-opportunities-for-data-scientists/>> accessed 10 March 2022. Competition & Markets Authority, 'Algorithms: How they can reduce competition and harm consumers' (2021) 50-51.

²⁶ See for instance the "Working group on Digital Investigations and Artificial Intelligence" in Conseil de la Concurrence of Luxembourg, 'Annual report 2020' (2020) 19.

²⁷ Javier Espinoza, 'EU Struggles to Build Antitrust Case against Amazon' *Financial Times* (2021) <<https://www.ft.com/content/d5bb5ebb-87ef-4968-8ff5-76b3a215eefc>> accessed 28 March 2022.

²⁸ D. Daniel Sokol and Jingyuan Ma, 'Understanding Online Markets and Antitrust Analysis' (2017) 15 *Northwestern Journal of Technology and Intellectual Property* 43, 52.

²⁹ Vivienne Brand, 'Corporate Whistleblowing, Smart Regulation and Regtech: The Coming of the Whistlebot?' (2020) 43(3) *University of New South Wales Law Journal* 1. See also Jennifer Cobbe, 'Administrative Law and the Machines of Government: Judicial Review of Automated Public-Sector Decision-Making' (2019) 39 *Legal Studies* 636; Herwig C.H. Hofmann, 'An Introduction to Automated Decision-making (ADM) and Cyber-Delegation in the Scope of EU Public Law' (2021) Indigo Working Paper.

reason that governments use it already in many different sectors.³⁰ Competition law enforcement should not be left behind.

Efficiency can be obtained by implementing tools that can help to faster analyse data and respond to different requests.³¹ For instance, interviews with law firms and competition agencies have revealed that sophisticated document management software with pattern recognition features (ML solutions) have been employed to identify documents covered by legal professional privilege, and to handle more efficiently huge amounts of data gathered during dawn raids. Furthermore, the Swedish CA (*Konkurrensverket*) is working on a project that uses AI solutions, such as natural language processing systems, to identify names and anonymise texts and subsequently to identify those covered by secrecy before giving out the documents. These processes would likely help authorities to be more efficient and save time.

2.2 Changes in the market structure: the online markets

Another reason for CAs to acquire digital skills is to better understand the modern “digital ecosystem”³² and its competition dynamics. Understanding the digital market is a key element to enforce competition law.

Nowadays, one of the most popular digital business models is the “multi-sided platform model”.³³ Multi-sided markets are not an exclusivity of the online world, as they can be found in other offline traditional markets.³⁴ What is different is the way digital platforms operate and how they generate incomes.³⁵ In a multi-sided market, digital platforms work as an “orchestrator” of at least two groups of customers, each of them at one side of the market and they interact with each other, creating network effects.³⁶ Several elements that differ from the traditional antitrust analysis should be considered.

Firstly, multi-sided platforms often charge only one group of costumers and offer free services to the other group.³⁷ “Zero-price” markets mean that platforms generate revenues by attracting advertising services. In order to target ads to consumers’ needs, platforms have to know what they like, their habits and their preferences.³⁸ Here is where data become vital for this business model, as data is in fact what users “pay” for enjoying free services.³⁹ It has also been suggested to consider data as a currency in order to assign monetary value to free services.⁴⁰ Hence, consumers at one side of the platform provide their personal data (collected through their online search history, client email and the like) in exchange of free products, which the platform uses for customers on the other side of the market.⁴¹ AI data analytics is usually employed to extract information from users’ data in order to improve services offered and enable advertisers to target ads to consumers.⁴² Free-of-charges services should be considered within the dynamics of competition as collecting and analysing data has become “a common strategy in order to compete”, with more offline companies breaking into the digital market, “becoming avid collectors and users of data”.⁴³

Secondly, another important element to consider is whether multi-sided market is interested by multi-homing or single-homing. The former refers to the choice to easily switch or simultaneously use services of

³⁰ Cary Coglianese and Alicia Lai, ‘Antitrust by Algorithm’ (2022) 2 *Stanford Journal of Computational Antitrust* 1 10-11; AlgorithmWatch, ‘Automating Society: Taking Stock of Automated Decision-Making in the EU’ (2019).

³¹ Marcela Mattiuzzo and Henrique Felix Machado, ‘Algorithmic Governance in Computational Antitrust—a Brief Outline of Alternatives for Policymakers’ (2022) 2 *Stanford Journal of Computational Antitrust* 23, 27; Schrepel (n 2).

³² Viktoria H. S. E. Robertson, ‘Antitrust market definition for digital ecosystems’ (2021) 2 *Competition policy in the digital economy – Concurrences* 3.

³³ Akman (n 3) 5. See also <<https://businessmodelanalyst.com/multisided-platform-business-model/>> accessed 28 March 2022.

³⁴ Sebastian Wismer and Arno Rasek, ‘Market definition in multi-sided markets’ (OECD 21-23 June 2017).

³⁵ Akman (n 3) 5.

³⁶ Ibid; Sokol and Ma (n 28); Wismer and Rasek (n 34).

³⁷ Wismer and Rasek (n 34).

³⁸ Robertson (n 32).

³⁹ Ibid.

⁴⁰ Wismer and Rasek (n 34) 8.

⁴¹ John E. Villafranco et al., ‘Competition Implications of Big Data and Artificial Intelligence/Machine Learning’ (White Paper 2/2021 ‘Artificial Intelligence & Machine Learning: Emerging Legal and Self-Regulatory Considerations’ American Bar Association Antitrust Law Section Big Data Task Force <https://www.americanbar.org/content/dam/aba/administrative/antitrust_law/comments/feb-21/aba-big-data-task-force-white-paper-part-two-final-215.pdf> accessed 10 March 2022) 11.

⁴² Ibid 11.

⁴³ Ibid 12.

competitors' platforms,⁴⁴ whilst the latter refers to the fact of staying with only one platform.⁴⁵ This is relevant for the dynamics of competition, as customers on one side of the market that "single-home" will not change platforms and competition for those will be higher. On the opposite, when multi-homing, competition will be lower.⁴⁶

Lastly, in multi-sided markets, groups of users interact with each other, and the more one group uses the platform, the more it would create value for the other group.⁴⁷ This phenomenon is known as the network effect and online markets can display direct or indirect network effects.⁴⁸ Social networks, such as Facebook or Sky are an example of direct network effect, in which more users increase the benefits of the service.⁴⁹ On the contrary, indirect network effect is when more users on a platform helps to improve the quality of the service by understanding customers' needs.⁵⁰ Interactions between users are important to understand digital markets' structure, as network effects have an impact on prices.⁵¹ "[N]etwork effects transform digital markets into imperfect markets, meaning that the utility one user gives to a good derives not from the good itself, but from the number of other users who are part of the same network".⁵²

In this scenario, traditional antitrust analytical tools may fail when applied to digital platform models.⁵³ For instance, market definition becomes more complex and the traditional SSNIP test may not apply.⁵⁴ There is also who suggests to use deep learning systems to identify the "product-market boundaries" and "understand the dynamics of market structure".⁵⁵ Given the complexity of multi-sided markets and the challenges to define the relevant market according to traditional competition tools, it is not too far to speculate the use of AI as a tool that can help CAs to define the relevant digital market. In fact, econometric tools are usually applied and encouraged by the Commission for the definition of the relevant market for antitrust analysis.⁵⁶ Since experimentations with ML solutions for market screening are ongoing, which will substitute or help the economic analysis traditionally carried out with econometric tools,⁵⁷ a parallel conclusion could be drawn for using ML for market definition. It remains to be seen how far CAs are willing to go to develop AI tools and the evidentiary value in case such systems will be implemented.⁵⁸

2.3 The need to reverse-engineering companies' algorithms

Interviews conducted with some CAs revealed that the main reason why they are starting to develop in-house technologies is to be able to reverse-engineering and understand how companies' algorithms work and make sure that they do not distort competition.⁵⁹ Enforcers need to develop new tools to be able to better protect

⁴⁴ Akman (n 3) 6.

⁴⁵ Wismer and Rasek (n 34) 9.

⁴⁶ Ibid 4, 9-11; Villafranco et al. (n 41) 22-23.

⁴⁷ Sokol and Ma (n 28) 51.

⁴⁸ Ibid.

⁴⁹ A social network works better when more people use it. Ibid 51; Akman (n 3) 6; Villafranco et al. (n 41) 15-16.

⁵⁰ Sokol and Ma (n 28); Villafranco et al. (n 41) 16.

⁵¹ Akman (n 3) 6.

⁵² Virginia Pavel Dobre, 'Old rules for new practices: Tying in the digital era' (2021) 2 Competition policy in the digital economy – Concurrences 35, 39.

⁵³ Sokol and Ma (n 28) 46.

⁵⁴ "The original SSNIP test does not account for interdependencies between distinct customer groups. In a two-sided market, for example, a price increase for one customer group (side A) leads to changes in demand not only on this side, A, but also on the other side, B. Ignoring such volume changes that emanate from indirect network effects may distort the result of the SSNIP test". Wismer and Rasek (n 34) 12. Sokol and Ma (n 28) 46.

⁵⁵ Yi Yang, Kunpeng Zhang and P.K. Kannan, 'Identifying Market Structure: A Deep Network Representation Learning of Social Engagement' (2021) Journal of Marketing 1.

⁵⁶ Commission, 'Commission Notice on the definition of relevant market for the purposes of Community competition law' (97/C 372/03); European Economic & Marketing Consultants, 'Application of econometric methods in market definition' (2005) <https://www.ee-mc.com/fileadmin/user_upload/Market_Definition.pdf>; <<https://www.ee-mc.com/expertise/digital-economy/market-definition-digital-economy.html>> accessed 28 March 2022.

⁵⁷ Rosa M. Abrantes-Metz, 'Proactive vs Reactive Anti-Cartel Policy: The Role of Empirical Screens' (8th European Summer School and Conference in Competition and Regulation, Corfu, Greece, July 2013); Rosa M. Abrantes-Metz and Albert D. Metz, 'Can Machine Learning aid in Cartel Detection?' (2018) CPI Antitrust Chronicle 1.

⁵⁸ "In many cases, authorities refrain from applying complex econometric methods, in particular due to time constraints, lack of proper data or methodical complexity which often comes along with limited robustness and difficulties in interpreting and communicating results". Wismer and Rasek (n 34) 14.

⁵⁹ Buttà et al. (n 16).

consumers and competition from anti-competitive behaviours, especially in the digital world.⁶⁰ These tools should put agencies in a better position to understand companies' algorithms, given the fact that "[g]overnments and regulators are at an 'enormous informational disadvantage' relative to technology companies".⁶¹

This is the idea of "fight[ing] technology with technology" as "[t]hese intelligent devices will be based on the idea of reverse-engineering algorithms in the hand of antitrust enforcers, with the purpose of understanding the decision-making process functions of their counter-actors [...] and also for officials to gain inside expertise on how price software works and are implemented by undertakings".⁶² In fact, in a digital economy, business strategies are often delegated to algorithms. Among others, price is often "decided" by an AI algorithm.⁶³ Not only undertakings, but also consumers benefit from technological innovations.⁶⁴ However, regulators and scholars have raised awareness on how algorithms can also represent a threat for competition law, by for example discriminating or colluding.⁶⁵

Firstly, algorithmic discrimination can occur when different prices are applied to consumers for the same product, without costs being an influencing factor, but only based on their willingness to pay (price discrimination).⁶⁶ Preferencing practices involving the use of algorithms are also a case of discrimination, when online platforms favour their own products, as in the *Google Shopping* case;⁶⁷ or when they favour products of a company that pays higher commissions by placing its items in a better position than those of its competitors,⁶⁸ as in the *Trivago* case.⁶⁹

Secondly, algorithms can infringe competition law by implementing and facilitating more stable cartels and ultimately colluding. For example, the same pricing algorithms could be shared by competitors and programmed to collude and set higher prices⁷⁰ (as in the *Topkins* case),⁷¹ or a third party, i.e. a consultancy or an IT company, could provide the same software to all its clients and have an interest in generating collusion when remuneration depends on companies' revenues⁷² (as in the *Eturas* case).⁷³ Another scenario that is heavily discussed is "algorithmic collusion", which could occur when autonomous self-learning algorithms learn that the best strategy to maximise a company's profit is to collude with competitors.⁷⁴ This is not yet a real-life scenario, but several experiments have demonstrated the feasibility of this hypothesis.⁷⁵ Therefore,

⁶⁰ Ibid.

⁶¹ Akman (n 3) 16 citing Furman Jason, et al., 'Unlocking Digital Competition: Report of the Digital Competition Expert Panel' (2019).

⁶² Niccolò Colombo, 'Virtual Competition: Human Liability Vis-À-Vis Artificial Intelligence's Anticompetitive Behaviours' (2018) 1 CoRe 11.

⁶³ OECD, 'Algorithms and Collusion: Competition Policy in the Digital Age' (2017).

⁶⁴ Ibid. 11 ss, the use of algorithms by businesses and governments and how they may create pro-competitive effects.

⁶⁵ Ariel Ezrachi and Maurice E. Stucke, 'Artificial Intelligence & Collusion: When Computers Inhibit Competition' (2017) 5 University of Illinois Law Review 1775; OECD (n 63); Bundeskartellamt & Autorité de la concurrence, 'Algorithms and Competition' (2019) Working Paper; Justin Johnson and Daniel D. Sokol, 'Understanding AI Collusion and Compliance' in D. Daniel Sokol and Benjamin van Rooij (eds), *Cambridge Handbook of Compliance* (SSRN 2020); Competition & Markets Authority (n 25); Stefano Azzolina, Manuel Razza, Kevin Sartiano and Emanuel Weitschek, 'Price Discrimination in the Online Airline Market: An Empirical Study' (2021) 16 Journal of Theoretical and Applied Electronic Commerce Research, 2282.

⁶⁶ Also known as personalised pricing, Competition & Markets Authority (n 25) 10 ss; Bundeskartellamt & Autorité de la concurrence (n 65) 6; Azzolina et al. (n 65).

⁶⁷ Commission Case AT.39740 *Google Search (Shopping)*, 27.06.2017 and case T-612/17 *Google LLC, and Alphabet, Inc. v. European Commission* [2021] EU:T:2021:763. See also Competition & Markets Authority (n 25) 25 ss.

⁶⁸ This is the case of so-called "ranking algorithms". Competition & Markets Authority (n 25); Bundeskartellamt & Autorité de la concurrence (n 65). See also Buttà et al., (n 16).

⁶⁹ Competition & Markets Authority (n 25) 23 and "Trivago misled consumers about hotel room rates" 2020, in ACCC <<https://www.accc.gov.au/media-release/trivago-misled-consumers-about-hotel-room-rates>> accessed 22 March 2022.

⁷⁰ Ibid; OECD (n 63).

⁷¹ OECD (n 63) 28; Johnson and Sokol (n 65); Ezrachi and Stucke (n 65) 1786.

⁷² This is the so-called "hub-and-spoke" scenario. OECD (n 63) calls this category "parallel algorithms". See also Ezrachi and Stucke (n 65); Johnson and Sokol (n 65); Bundeskartellamt & Autorité de la concurrence (n 65) 31 ss.

⁷³ Case C-74/14 *'Eturas' UAB et al., v Lietuvos Respublikos konkurencijos taryba* [2016], EU:C:2016:42.

⁷⁴ OECD (n 63); Bundeskartellamt & Autorité de la concurrence (n 65); Johnson and Sokol (n 65); Ezrachi and Stucke (n 65) 1795.

⁷⁵ Bundeskartellamt & Autorité de la concurrence (n 65) 45. See also Ai Deng, 'From the Dark Side to the Bright Side: Exploring Algorithmic Antitrust Compliance' (2019 NERA Economic Consulting and Johns Hopkins University);

enforcers might soon be called to deal with such a situation, and having the right set of tools will help analysing companies' algorithms faster and in a more efficient way. And even if this could be considered a case of tacit collusion, the more companies use AI, the more these practices may become frequent, leading to undesired consequences for competition.⁷⁶

2.4 The decline of leniency applications

Another reason why CAs should invest in AI technologies to boost their *ex officio* investigations is the decline of leniency applications, the enforcement tool on which agencies mostly rely. Leniency programmes have been implemented worldwide since the earlier 90s when the U.S. first adopted its antitrust amnesty programme in 1993.⁷⁷ The EU Commission followed with its leniency programme implemented in 1996 and revised in 2002 and 2006.⁷⁸

Under the EU leniency programme, companies participating in a cartel may be granted full immunity from fines eventually imposed if they are the first to come forward and reveal the existence of a cartel, by providing the Commission with sufficient information to start an investigation and meet the requirements of the leniency notice.⁷⁹ Subsequent cartelists are also encouraged to apply for leniency and provide evidence of “sufficient added value” as they may be rewarded for their cooperation by granting partial immunity up to 50% from the fines.⁸⁰ The aim of this programme is to detect cartels and obtain direct evidence by the participants, and work as a deterrent and “a destabilising instrument for the cartels”,⁸¹ as it creates distrust among cartelists who may have to race to be the first to apply and benefit from full immunity.⁸²

According to a study, many of the cartels detected by the Commission in the last years come from immunity applicants.⁸³ The leniency programme is considered the most effective tool the Commission relies on to uncover secret cartels.⁸⁴ However, some scholars have questioned this reactive behaviour of the Commission⁸⁵ which seems to “over-rely” on its leniency programme as the solely methodology to uncover cartels.⁸⁶

Applying for immunity is not an immediate consequence of a weak cartel, as such a decision implies a complicated risk analysis, where benefits and disadvantages need to be accurately weighted.⁸⁷ Among the disadvantages, besides the most obvious one which is the risk of incurring in private damage actions,⁸⁸ uncertainties around the concept of cartel is considered a factor able to draw back a potential leniency applicant.⁸⁹ For instance, the concept of “secret cartel” becomes blurry in hypothesis of information exchange, price signalling and hub-and-spoke cases⁹⁰ without even involving any sophisticated technological means. It is stated that “[l]eniency may therefore be the right option for the classic “smoke-filled room” hardcore cartels”.⁹¹ Legal concepts may become even more blurry now in the digital era where new ways of infringing

Thomas Fetzer, Damaris Kosack, Heiko Paulheim and Michael Schlechtinger, ‘How algorithms work and play together’ (2021) 3 Artificial Intelligence and Competition Law – Concurrences 19.

⁷⁶ OECD (n 63) 33 ss. according to which “[a]lgorithms can amplify the so called “oligopoly problem” and make tacit collusion a more frequent market outcome”. Ezrachi and Stucke (n 65) 1795 stated that “conscious parallelism is legal. The question is whether such practices, when implemented by smart machines in a predictable digitalized environment, ought to be condemned”.

⁷⁷ OECD, ‘Roundtable on ex officio cartel investigations and the use of screens to detect cartels’ (2013).

⁷⁸ Ibid; Peter T. Dijkstra and Jonathan Frisch, ‘Sanctions and Leniency to Individuals, and its Impact on Cartel Discoveries: Evidence from the Netherlands’ (2018) 166 De Economist 111 112.

⁷⁹ <https://ec.europa.eu/competition-policy/cartels/leniency_en> accessed 1 March 2022.

⁸⁰ Ibid.

⁸¹ Joan-Ramon Borrell, Juan Luis Jiménez and José Manuel Ordóñez-de-Haro, ‘The Leniency Program: Obstacles on the way to collude’ (2015) 3 Journal of Antitrust Enforcement 149.

⁸² Ibid; OECD (n 77).

⁸³ Johan Ysewyn and Siobhan Kahmann, ‘The decline and fall of the leniency programme in Europe’ (2018) 1 Concurrences 44.

⁸⁴ Ibid; Abrantes-Metz 2013 (n 57).

⁸⁵ Abrantes-Metz 2013 (n 57).

⁸⁶ Ysewyn and Kahmann (n 83) 45.

⁸⁷ Ibid.

⁸⁸ See for instance International Competition Network, ‘Good practices for incentivising leniency applications (Subgroup 1 of the Cartel Working Group, 30 April 2019).

⁸⁹ Ysewyn and Kahmann (n 83).

⁹⁰ Ibid.

⁹¹ Ibid 51.

competition law are emerging, making collusion easier and far from the traditional “smoke-filled room” cartel agreements.

If companies are not sure whether their conduct can be considered a “secret cartel” they might decide that it is better to let “the regulator [deal] with legal concepts that are in flux and fighting the case”.⁹² The chances to have a company coming forward with an immunity application is even reduced if they lack knowledge of the way their algorithms make certain decisions. In fact, they might not even be aware of any wrongdoing. This could be a case of tacit collusion or parallel behaviour and therefore not of interest for CAs, but sooner or later, they should start thinking of dealing with such situations as the outcome is still undesirable for competition and consumers’ welfare.⁹³ If leniency applications have decreased by almost 50% in the last years (mostly because of the risk of facing long and expensive private actions, especially against the immunity applicant),⁹⁴ this instrument will not be much of help with unconventional ways of infringing competition law, such as some of those highlighted in the previous section. Therefore, given the less appeal that leniency programs have due to follow-up damages claims and the potential of being less effective and adapt to the digital market, it is desirable for CAs to develop new and alternative pro-active means to boost their *ex officio* investigations.

IV. Conclusion

Technology plays an important role in shaping market’s structure, economic dynamics, the way businesses make decisions and interact with each other, and ultimately the way companies can infringe competition law. CAs have just started to take the first steps into the digital world of AI and ML for competition enforcement, by building in-house digital platforms, digital screening tools and pilot projects to study the functioning of companies’ algorithms.

“Fight[ing] technology with technology”⁹⁵ could be the most powerful mean to efficiently react and detect digital competition infringements. Competition law needs to be adapted and shaped according to the evolution of economy and enforcement tools need to follow the same trend. By solely relying on reactive tools, such as leniency programs, which have already registered an important decrease, CAs may be unable to detect harmful and insidious anticompetitive practices that involve the use of technology. Without the right set of digital enforcement tools, CAs may in fact risk being left behind and failing to understand companies’ algorithms that may infringe competition law, or to understand how market players interact with each other in a way that is relevant for competition analysis. AI could help CAs to enhance efficiency, accuracy and time-saving, avoiding long investigations that may arrive to a positive decision when it is too late and a particular remedy would not be useful anymore.⁹⁶

This paper has highlighted some reasons why CAs have started to developed their own digital investigation tools, according to interviews conducted with some of them, such as the need to reverse-engineer companies’ algorithms. Other reasons for investing in new technologies for enforcing competition law have also been considered, such as the need to enhance efficiency, understand the new digital market structure, and the failing of leniency programs. Therefore, it seems reasonable to advocate for a more pro-active role of CAs that should use technology to live up to the new challenges of digital competition law.

⁹² Ibid 52.

⁹³ OECD (n 63).

⁹⁴ Ysewyn and Kahmann (n 83) 45 citing the Global Competition Review’s Rating Enforcement Reports 2017, 2016 and 2015.

⁹⁵ Colombo (n 62).

⁹⁶ Sokol and Ma (n 28).

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