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Algorithmic competition – Summaries of Contributions

14 June 2023

This document reproduces summaries of contributions submitted for Item 5 of the 140th OECD Competition Committee meeting on 14-16 June 2023.

More documents related to this discussion can be found at https://www.oecd.org/competition/algorithmic-competition.htm

Antonio CAPOBIANCO
Antonio.Capobianco@oecd.org, +(33-1) 45 24 98 08

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Summaries of Contributions

This document contains summaries of the various written contributions received for the discussion on Algorithmic competition (140th OECD Competition Committee meeting on 14-16 June 2023). When the authors did not submit their own summary, the OECD Competition Division Secretariat summarised the contribution. Summaries by the OECD Secretariat are indicated by an *.

BIAC

The past few years have witnessed an increased use of pricing algorithms and artificial intelligence by firms offering services and products online and offline. Some commentators have raised concerns that, coupled with the availability of large data sets, this practice might change the competitive landscape and have an effect on the intensity of price competition.

In June 2017, the OECD held a roundtable on algorithms and collusion to discuss a number of the challenges raised by algorithms.[1] In particular, the roundtable addressed the question whether competition enforcement agencies should reconsider the traditional antitrust concepts of "agreement" and "tacit collusion," and whether antitrust liability can be imposed on algorithms' creators and users. With regard to regulatory intervention, the Competition Committee advocated a need to evaluate the practice further and carefully weigh the benefits of tackling collusion against the risks of over-enforcement. Furthermore, the participants to the roundtable identified the risk that a regulatory intervention may hinder investment and innovation in digital markets.

BIAC notes that, since the 2017 OECD roundtable, the number of actual cases involving algorithmic (explicit or tacit) collusion has not grown significantly. This raises the question whether competition agencies are indeed "missing" anything, or whether the initial potential concerns have taken longer to manifest themselves due to the evolution of the economy. However, as the Secretariat's Background Paper for this roundtable[2] observes, recently, two new questions have come up.

First, the debate surrounding tacit collusion has gained momentum with the rise of a new generation of algorithms, i.e., algorithms with the logic to collude and self-learning algorithms. The question is whether these phenomena should prompt changes in the way enforcement against algorithms has been perceived so far.

Second, certain recent literature proposes moving beyond collusion and exploring how the increasingly precise practice of individualized targeting by algorithms can facilitate the practice of a range of abuses of dominance, including predatory pricing, rebates, and tying and bundling.[3]

While BIAC acknowledges the technological advances, as well as the most recent thinking on algorithmic pricing, it warns against overzealous enforcement action based on these observations. Indeed, proper competition law enforcement requires proper insight into the necessary conditions for competitive harm to occur, as well as adequate knowledge of these phenomena in practice. The assessment of the exploitative nature of personalized pricing also needs to take place within a proper framework to distinguish market expanding price discrimination from exploitation. It also requires criteria to determine acceptable and unacceptable factors of price personalization. The latter is more likely to fall within the

[1] *Algorithms and Collusion*, OECD, https://www.oecd.org/competition/algorithms-and-collusion.htm.

[2] OECD, Algorithmic Competition – OECD Competition Policy Roundtable Background Note (2023), https://www.oecd.org/daf/competition/algorithmic-competition-2023.pdf.

[3] *See, e.g.*, Thomas K. Cheng & Julian Nowag, *Algorithmic Predation and Exclusion*, 25 UNIV. PENN. J. BUS. L. 41 (2023), https://scholarship.law.upenn.edu/cgi/viewcontent.cgi?article=1677&context=jbl. Recent literature also concentrates on algorithmic pricing in merger review. *See, e.g.*, Ai Deng &Cristián Hernández, *Algorithmic Pricing in Horizontal Merger Review: An Initial Assessment*, ANTITRUST (36) 2 (Spring 2022), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3971920.

remit of consumer protection law, rather than competition law, as such rules should extend beyond dominant firms.

Brazil

Algorithms, which are instructions used especially by computers to process information and make decisions, have become increasingly prevalent in investigations conducted by the Brazilian competition authority. This is particularly evident in cases involving their use in pricing, search, and ranking. Concerns arise from the design and evolution of algorithms and often relate to issues such as algorithmic collusion, the sharing of sensitive information, anticompetitive self-preferencing, and the accumulation of large amounts of data through mergers and acquisitions.

With respect to algorithmic collusion, CADE considers the Brazilian competition legislation to be more than sufficient to address and punish cases in which the algorithm serves merely as a messenger tool. However, in other instances, it may prove exceedingly difficult for antitrust authorities to establish the elements of intentionality and coordination between market players. This is especially true when there is no contact between players and any anticompetitive outcome may result from computational calculations that can choose price parallelism among other paths.

Although empirical evidence for scenarios of algorithmic collusion in which there is no human action remains scarce, some studies have provided evidence that the adoption of pricing algorithms may facilitate the implementation of tacit collusion. In light of this challenge, CADE remains observant and may update its approach in the area if needed.

Overall, the cases suggest that framing algorithmic competition issues within traditional theories of harm is less challenging than finding evidence of algorithmic antitrust violations or devising strategies to prevent them, especially as technology continues to evolve rapidly. Sharing information on measures adopted by other jurisdictions and evaluating their effectiveness can be an important step in preventing harm to competition while avoiding imposing unnecessary burdens on firms and their transactions.

Denmark

The Danish Competition and Consumer Authority (DCCA) has gained a number of insights with regards to investigating algorithms from a competition perspective. This note will briefly present those learnings and insights, structured along the headings suggested in the annex to the OECD's call for contributions dated 1 February 2023. The note concludes with a discussion on how these findings can shape future enforcement activities and policy initiatives.

Key takeaways

Algorithms have become the backbone of the digital services and solutions utilised by both individuals and firms on a daily basis. These powerful tools have the capability to solve a wide range of complex problems, often working behind the scenes to support the seemingly simple interfaces we interact with. Various digital platforms and firms leverage algorithms to disrupt traditional models and enhance market efficiency in numerous ways. They are used to e.g. create effective production processes, inform or automate strategic business decisions, or improve user experiences.

While algorithms offer numerous benefits, they also have the potential to harm competition among businesses. Certain algorithmic practices can indeed enable anti-competitive agreements and facilitate the abuse of dominant market positions.

Algorithms vary widely in complexity and function. It is important for competition authorities not to shy away from investigating algorithmic practices but to carefully consider the available investigation strategies and methods on a case-by-case basis, such as: manual inspection of code, simulating algorithm output, or analysing actual output data. In all cases, particular attention should be given to the data collection strategies employed by competition authorities, to ensure that data are relevant for the investigation and of high quality.

Competition enforcement can get far in combatting harmful algorithmic conduct via the traditional prohibitions, as well as with initiatives like the EU's Digital Markets Act. However, competition authorities may need to enhance their enforcement capabilities to effectively tackle competition-related issues arising from algorithmic practices. Possibilities to require A/B testing – i.e. controlled experiments where a specific feature of e.g. an algorithmic code is altered to analyse how it impacts the algorithm's output – could be a way to strengthen the toolbox of competition authorities, and so could market investigations. It may also be beneficial to require firms to store and make available version histories and log files of the algorithms they employ.

European Union

Over the last decade, there has been an intense debate about the impact of algorithms on the competitive landscape and about the role of competition enforcement in this respect. There is consensus on the growing importance of algorithms in the new data economy and on the benefits that algorithms can bring in terms of efficiency gains. It is also generally recognised that competition law can and actually should play a major role, in particular to prevent the use of algorithms as a sophisticated instrument of collusion or abuse. However, there are still a number of aspects of this new "algorithmic competition" that are not completely clear and where the discussion is ongoing.

The two main types of practices that have attracted the attention are algorithmic collusion and algorithmic exclusionary abuses:

- In cases where algorithms are used to support or implement a pre-existing collusion, the European Commission would not see particular issues in the application of the rules on restrictive agreements and considers that the current legal framework is still relevant to prosecute such infringements. Conversely, on pure algorithmic collusion – intended as collusion where human intervention is limited and the interaction between competitors is determined by complex and self-learning algorithms – many points are still open to debate and the application of the traditional concepts related to restrictive agreements is not straightforward;
- Some recent cases have successfully explored the relevance of algorithms to find exclusionary conducts, as instruments to implement an abusive strategy already determined by the dominant undertaking. It remains to be seen whether other theories of harm can be equally applied to other algorithmic practices and, above all, whether an abuse of a dominant position can be found and sanctioned even in situations where the conduct is determined by the algorithm itself – assuming that this is currently, or will in the future be, possible.

In all cases, investigations of algorithmic conducts can be complex and may require specific competences and skills that are not readily available to competition authorities. One common reflection could be whether it is necessary to reinforce the detection methodologies at the disposal of enforcers.

We remain in the early stages of our collective attempts to conceptualise a legally certain but future-proof approach to the complex interactions between algorithms and competition law. The intense debate of the recent years is not yet reflected in a consolidated practice of the various competition authorities and therefore a series of relevant aspects still need to be clarified.

France

Algorithms are among the most important technological levers in the growing digitization of the economy, enabling companies to be more innovative and efficient.

A debate has emerged in recent years about whether and to what extent algorithms could also have adverse effects on the competitive functioning of the markets.

The contribution looks back at the joint study carried out in 2019 by the *Autorité de la Concurrence* and the Bundeskartellamt, in which these competition authorities focused on pricing algorithms and the risks of collusion, while also considering the interdependencies that may exist between algorithms and the market power of the companies that use them, as well as the practical difficulties encountered when investigating algorithms.

More recently, other algorithm-based technologies have entered the public debate, such as conversational language models. After presenting how these technologies work, the *Autorité de la Concurrence* shares in this contribution some preliminary thoughts on the potential competitive risks that these new types of algorithms could raise, particularly in the field of unilateral practices.

Finally, the *Autorité de la Concurrence* has considered the benefits of algorithms, for instance in helping competition authorities carry out their duties. A practical example drawn from the *Autorité de la concurrence*'s own experience illustrates this point. This is a tool in the form of a network graph providing the user with an overview of the *Autorité de la concurrence*'s decision-making practice.

Germany

Algorithms provide a wide variety of beneficial opportunities for the economy and society. For example, they can facilitate innovative services, allow for the personalisation of products and services, support the optimisation of inventories and reduce search costs. They may nevertheless have detrimental effects on competition, too. As digital markets keep evolving, authorities should continue expanding their expertise on algorithms, in exchange with one another as well as by interacting with businesses, academics and other regulatory bodies. Such an effort is in line with the authorities' more general tendency to devote more resources to the challenges posed by the ongoing process of digitalisation. The Bundeskartellamt has already dealt with a certain spectrum of cases involving algorithms. In the situations considered so far, the contemporary legal framework allowed the Bundeskartellamt to sufficiently address competitive concerns relating to algorithms. However, it is still unclear which types of algorithm-related cases competition authorities will have to deal with in the future. Consequently, it is not yet possible to predict whether it will be necessary to reconsider the current legal regime and the methodological toolkit to address potential challenges that algorithms – also including the use of artificial intelligence – might pose, and, if so, what this change will look like.

Italy

The Italian Competition Authority is aware that, despite undisputable efficiency gains, algorithms can raise competition concerns. AGCM started to consider competition and algorithms in 2017, when it launched a sector inquiry on Big Data in cooperation with the Italian telecom (AGCOM) and privacy regulators (GDPD). This represented an opportunity to engage in an inter-institutional dialogue that allowed to address multi-disciplinary challenges from competition, regulatory and privacy perspectives.

Some of the competition concerns envisaged in the sector inquiry materialised and were addressed in subsequent enforcement action undertaken by the Authority. In its 2021 investigation concerning an "anti-fraud project" established the Italian Association of Insurers, AGCM acknowledged the positive purpose of the initiative, but made binding a set of commitments, which include the algorithm used for data processing, with a view to preventing possible coordination and homogenization of important aspects of the policies offered by the companies. In its FBA Amazon case in 2021, AGCM examined the role of Amazon's algorithm in the tying strategy leading to the raising rivals' costs on the logistics services market.

On the demand side, trustworthy algorithms can facilitate consumer choice and lead to efficiency. But, algorithms are associated with several other risks in the way they select information and affect consumer behaviour. They can be programmed to bias consumers' decisions, manipulate rating systems, collect and use data and content in violation of privacy and property rights, resulting in consumer harm. The Authority employs its consumer protection tools to empower consumers and enhance their ability to make fully informed choices. At the same time, AGCM fights against behaviours enacted through algorithms that can harm vulnerable categories of consumers, as in its TikTok case. This combined action between competition enforcement and consumer protection allows for synergies and cross-fertilization between the two disciplines when facing the digital challenges.

Moreover, AGCM's experience shows, in light of the nature and implications of algorithmic competition, the interplay with regulation and privacy protection needs to be taken in due account. The challenge for the future is to foster inter-institutional cooperation.

Finally, the Italian Competition Authority believes that, given the complexity of these topics, international co-operation is of great value, insofar as it enables to share knowledge and experience with other agencies.

Japan

In March 2020, the Japan Fair Trade Commission (JFTC) published a report of a market survey on restaurant portals with regard to whether or not the setting or operation of an algorithm violates the Antimonopoly Act, which pointed out that such act by restaurant portals may constitute discriminatory treatment or abuse of superior bargaining position, which are prohibited under the Antimonopoly Act.

Subsequently, a restaurant operator whose restaurants are listed on a restaurant portal filed a civil suit in May 2020, alleging that the setting or operation of an algorithm by the portal operator violated the Antimonopoly Act. In the course of the trial, the JFTC, upon the request of the court, submitted its opinion to the court.

One of the issues of this case was whether displaying restaurants' ratings by the portal operator based on the algorithm is found as "executing transactions," which is one of the requirements for abuse of superior bargaining position. On this point, the JFTC's opinion declared that such act in this case falls under the "executing transactions." Also, the JFTC discussed what and how to consider in determining whether the defendant's act meets the other requirements of an abuse of superior bargaining position. In 2022, the court held that the act violated the Antimonopoly Act as an abuse of superior bargaining position.

According to a news report, the plaintiff stated that it would not have filed this suit without the publication of the report by the JFTC. This can be evaluated that presenting problems in the report have led to private enforcement of the Antimonopoly Act. Also, the JFTC, upon the request of the court, submitted its opinion on the application of the Antimonopoly Act in this case. This is an example of litigation advocacy by the competition authority.

Kazakhstan

Today, the Republic of Kazakhstan is witnessing a significant growth in the volume of digital platforms, accompanied by the emergence of major players in the e-commerce sector. This trend clearly indicates the strengthening of their market power.

However, alongside this development, the formation of business models by digital platforms, which rely on algorithmic pricing, brings forth new risks concerning competition and consumer protection.

In the Republic of Kazakhstan, a notable illustration of unified algorithms being employed is observed in the cab services market and airline industry.

Under current competition law, the actions of digital platforms can be assessed for potential abuse of a dominant position or coordination of prices among market participants.

However, the response of antimonopoly authorities primarily focuses on rectifying the resulting damages. The process of collecting evidence and seeking legal recourse often entails a substantial time investment, which does not guarantee the mitigation of emerging antitrust risks.

Korea

Algorithms have pro-competitive effects, but they can also be used as a means to engage in anti-competitive conduct, including collusion and monopolization. Thus, the Korea Fair Trade Commission (hereinafter the "KFTC") has been making efforts to improve its systems and enforce the law against self-preferencing by manipulating algorithms.

First, the KFTC has sanctioned the self-preferencing of platform operators that unfairly leverage their dominance in other markets by manipulating algorithms. For example, the KFTC imposed remedies and a fine of KRW 26.6 billion on Naver, the number one search engine in Korea, for secretly manipulating its search algorithms in the comparison shopping search results to place products sold on its open market at the top of search results before others, thereby significantly increasing its market share in the open market. In addition, the KFTC imposed remedies and a fine of KRW 25.7 billion on Kakao Mobility, the number one company in Korea's taxi-hailing service market for standard taxis, for secretly manipulating dispatch algorithms more favorably to its franchise taxi drivers on the Kakao T app, which provides taxi-hailing services for standard taxis, thus rapidly increasing its market share in the market for franchise taxis and strengthening its dominance in the market for standard taxis.

Based on the accumulated experience in this process, the KFTC established the "Online Platform Review Guidelines" that contain matters to consider in legal interpretation.

The KFTC will continue to vigorously enforce the law against the monopoly conduct of platform operators by manipulating algorithms and examine different measures in the long term to prevent the abuse of algorithms as a means of engaging in anti-competitive practices.

Mexico

The evolution of technology and the increasing use of data processing tools have brought a greater use of algorithms of different kinds and purposes, in several industries including, indeed, the digital markets. The use of these algorithms has had several advantages for those markets but has also posed several concerns regarding possible adverse effects on the competition process. Since Mexico has not been the exception to the antitrust scrutiny of the use of algorithms, this contribution presents the experience of the Federal Economic Competition Commission (COFECE) about the incidence of algorithms in anticompetitive practices, relative monopolistic practices (or abuse of dominance) and absolute monopolistic practices (cartel agreements or collusion) and which theories of harm, considering legal and economic elements, are under the scope of the legal framework provided by the Federal Economic Competition Law (LFCE for its initials in Spanish) in the context of some ongoing investigations and monitoring activities. Finally, the contribution submits some of the challenges lying ahead for COFECE and the lessons learned so far.

Norway

In 2020, The Norwegian Competition Authority ("NCA") surveyed Norwegian retailers and software providers on the use of pricing algorithms. The results documented that pricing algorithms were widely used in Norway. Since then, technological progress has likely made the algorithms faster and more widespread. Therefore, the NCA works on a proactive strategy to deal with competition problems arising from algorithmic pricing. This submission presents some observations in this regard, with special emphasis on how algorithmic pricing can facilitate horizontal collusion and relevant remedies regulators can consider.

Firms often chose simple algorithmic pricing strategies that involve quickly mimicking competitors' price changes. Both economic theory and empirics predicts that such algorithmic strategies can restrict competition. Competition agencies should put special emphasis on these strategies when working to detect harmful algorithmic pricing.

In some cases, TFEU Article 101 can be invoked to challenge harmful algorithmic pricing. In situations where an agreement or concerted practices cannot be proven to the requisite legal standard, market investigations followed by remedies may provide a suitable alternative. Remedies should strive to alleviate harm while maintaining the efficiencies associated with algorithmic pricing, particularly its ability to quickly adapt to market fluctuations.

A thought-provoking approach is to inhibit firms from reacting quickly to their competitors' price adjustments. There are various measures that can achieve this objective. The challenge lies in identifying measures that are easy to monitor and effectively slow down response to price changes without impeding the positive impacts of algorithmic pricing.

Determining the most appropriate remedy, if any, requires a case-by-case assessment. In situations where algorithms limit competition by reacting immediately to competitors' price changes and market conditions remain relatively stable, the NCA may consider regulations that permit price adjustments only at predetermined intervals, such as once per day or week. In instances where market conditions exhibit greater variability, it could be more advantageous to restrict the frequency with which firms can access or utilize competitors' price information, even if this necessitates increased administrative efforts for monitoring purposes.

Portugal

The digital sector has been one of the priorities at the Autoridade da Concorrência – Portuguese Competition Authority (AdC) since 2018. Within the digital sector, the AdC has given special focus to the use of algorithms by firms, encompassing monitoring, pricing, ranking, search and recommendation algorithms.

In 2019, the AdC published the Issues Paper "Digital Ecosystems, Big Data and Algorithms"[4], covering some of the key challenges that the digital sector brings to competition policy. This included a specific section on algorithms and a survey on the prevalence of use of monitoring and pricing algorithms in Portugal.

In 2021, the AdC launched a call for information regarding the digital sector to all interested parties[5]. It aimed at identifying possible barriers to entry and expansion in the digital sector, and included questions on the use of algorithms and potential competition concerns algorithms may raise.

In the same year, the AdC also sent a survey to online retailers of electronic products and household appliances in Portugal to understand their use of monitoring and pricing algorithms.

In 2022, the AdC published a policy brief covering its activity in the digital sector, summarizing the conclusions from the call for information and the survey on algorithms, as well as the AdC's recent investigative work[6].

In particular, the AdC has focused on how firms use algorithms in the Portuguese market, especially algorithms used for monitoring competitors and for setting the pricing of the company's own products.

The evidence gathered by the AdC indicates that the usage of monitoring algorithms in Portugal is relatively widespread, in particular among large retailers active online. Pricing algorithms are also used by companies active in the Portuguese market, but to a lesser extent.

Stakeholders have raised a number of concerns relating to the use of algorithms, including regarding the extent to which companies using algorithms may determine what consumers see online and influence their choices, the lack of transparency regarding the usage and objectives of algorithms, as well as the use of so-called "dark patterns" to affect consumer decision-making.

[4] AdC (2019), *Issues Paper on Digital Ecosystems, Big Data and Algorithms*. Available here.

[5] The call for information, the contributions by the interested parties and the summary of contributions are available here.

[6] AdC (2022), *Defence of Competition in the Digital Sector in Portugal*. Available here.

South Africa

Learnings from the Competition Commission of South Africa ("CCSA") indicate that algorithms shape competition in online markets in the form of ranking, display and size of a business users results on the search results page. This is because algorithms determine where a result is ranked, how it is displayed and what size it will be. Visibility on an online platform is paramount to the performance of a business and is the key driver of online consumer traffic to that business' website. Here online platforms, especially those with market, intermediation, or gatekeeper power, can shape the winners and losers who depend on the platform for online discoverability, and distribution of goods and services. In the online space, large players are the winners as they have the resources to outbid rivals on paid and sponsored search and invest in substantial resources to dominate SEO. This creates a virtuous circle that reinforces their entrenchment. For small players, establishing an organic presence on the search results page takes a long time and is resource intensive, and on paid or sponsored search small players are typically outbid by larger players. This creates a market structure where large platforms dominate the bulk of consumer traffic and small and new players face significant barriers to expansion and are relegated to catering for niche online markets. Lastly, business users are vulnerable to exploitation by the specialised or general search engines they are dependent on, particularly those with market power, to distribute their goods or services online.

Price recommendation systems and AI tools are becoming ubiquitous in the online space. By crawling online data such as prices and quantities they can provide services such as allowing users to monitor their own and rival's prices on various online distribution channels, providing estimated industry demand, and offering price recommendation services. While some might argue these services have the capacity to improve allocative efficiencies, a real concern for tacit collusion exists. This concern is heightened by the vast amount of publicly available data online of a commercial nature and at a granular level. If done what is promised, to maximise their client's profits and this is done collectively for these clients, it may be the case that price recommender services lead to a collusive outcome. Furthermore, if there is wide-spread usage of price recommender systems in any given industry, and the bulk of these users adhere to these prices recommendations, it is likely that this will result in a collusive outcome.

Spain

This contribution by the Spanish National Markets and Competition Commission (CNMC)[7] addresses the topic of the Roundtable on "Algorithmic competition" to be hosted by the OECD in June 2023.

The CNMC has among its top priorities adapting its competition enforcement to the current wave of digitisation and artificial intelligence. This commitment has led to initiatives on two different fronts.

On the one hand, an active analysis and monitoring of digital business models and sectors, including the potential of algorithms and other information technologies to enable collusion and anticompetitive conduct. One of the most prominent cases in this regard was the case S/0003/20 PROPTECH, where several companies were imposed fines of €1.25 million for using a software to set minimum commissions and facilitate information sharing in the real estate brokerage market.

On the other hand, the creation of an Economic Intelligence Unit (EIU). Among other things, this unit has the objective of applying new techniques of data analysis and incipiently artificial intelligence to detect not only new forms of (algorithmic) anticompetitive conduct but also traditional ones. The unit also aims at increasing ex-officio detection and at strengthening the robustness of other investigations.

The CNMC remains committed to progressing in these two fronts in order to ensure that competition is safeguarded in digital activities and throughout the economy.

[7] This contribution has been prepared by the staff of the CNMC and shall not be regarded as the official position of the CNMC unless it refers to CNMC approved documents.

United Kingdom

In January 2021, the CMA published a paper entitled *Algorithms: How they can reduce competition and harm consumers* (the 'CMA 2021 Algorithms paper').[8] The CMA 2021 Algorithms paper clearly sets out the potential harms caused by the use of algorithms and has been drawn on extensively in the background paper produced for the OECD roundtable discussion. For this reason, this paper does not seek to cover the same areas of discussion again, including the ability of algorithms to reduce competition by facilitating collusion.[9] How the use of algorithms by actual or potential competitors may increase the risk of collusive outcomes in a market is also considered further in the information exchange chapter of the CMA's draft guidance on the application of the Chapter I prohibition in the Competition Act 1998 to horizontal agreements.[10]

Instead, this paper sets out the research undertaken by the CMA since the CMA 2021 Algorithms paper, predominantly under the umbrella of the Digital Regulation Cooperation Forum (DRCF).[11] It then goes on to present a summary of the cases undertaken by the CMA that have involved the investigation of algorithmic systems and the lessons that can be learnt for competition authorities undertaking such work.

[8] https://www.gov.uk/government/publications/algorithms-how-they-can-reduce-competition-and-harm-consumers/algorithms-how-they-can-reduce-competition-and-harm-consumers

[9] The CMA considers that algorithms can reduce competition by facilitating collusion in three ways: (i) they can be used to automatically detect and respond to price deviations by competitors, which could make explicit collusion between firms more stable, as there is less incentive for those involved to cheat or defect from the cartel; (ii) firms can also use the same algorithmic system to set prices, for example by using the same third-party software, through which they could exchange information; (iii) there are also concerns that algorithms can learn to collude tacitly, without firms explicitly communicating with each other. See *Algorithms: where's the harm? - Competition and Markets Authority*

[10] See *Draft guidance on Horizontal Agreements - GOV.UK (www.gov.uk)*

[11] https://www.gov.uk/government/collections/the-digital-regulation-cooperation-forum