European Commission

Final Report

Expert Group for the Observatory on the Online Platform Economy

Market power and transparency in open display advertising – a case study

Contents

Market power and transparency in open display advertising - a case study

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1 Introduction

Market power issues in digital advertising have received large attention from public authorities. The competition authorities of France and UK each published a report on the digital advertising market (Autorité de la Concurrence 2018; CMA 2020) and the Australian Competition and Consumer Commission, after a Digital platform inquiry (ACCC 2019), published the interim report of its Digital advertising services inquiry in September 2020. [1]

There are two main formats of digital advertising: search advertising and display advertising. Search advertising consists of paid-for listings in search results, while display advertising includes rectangular ads that appear on websites visited through a browser. The display advertising can further be divided into open display advertising and display advertising from "owned-and-operated" platforms. In the open display advertising market, the vast majority of publishers (e.g. newspapers) sell their advertising inventory to a wide range of advertisers through a complex chain of third-party advertising intermediaries, also called "ad tech providers". The open display advertising provides an alternative to the display advertising from 'owned-and-operated' platforms (e.g. Google, Facebook, Amazon), which sell their own advertising inventory (i.e. ad space on their own websites) through their own ad tech interface within their so-called "walled gardens". On October 20, 2020, the US Department of Justice filed a lawsuit against Google for unlawfully maintaining monopoly in search and search advertising (US DoJ 2020). This report is about Google's exclusionary and exploitative practices *in the ad intermediation market for open display advertising*. On December 16, 2020, ten states in the U.S. filed a lawsuit against Google's monopolisation of online display advertising. [2]

In open display advertising, to achieve the complicated task of selecting an ad to be served to an individual in real time and establishing the price to be paid for doing so, publishers and advertisers rely on a vertical chain of intermediaries. On the supply side, there are publisher ad servers and supply-side platforms (SSPs), which include ad exchanges. On the demand side, there are demand-side platforms (DSPs) and advertiser ad servers. Google is the leader at each

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[1] https://www.accc.gov.au/publications/serial-publications/digital-platform-services-inquiry-2020-2025/digital-platform-services-inquiry-september-2020-interim-report

[2] The content of the document filed by the ten states is largely consistent with this report. For instance, it states that in the U.S, Google has monopoly power in the publisher ad server market, in the display ad ex change market and in the ad buying tool market for small publishers. The document goes beyond this report in two respects. First, it provides new details, based on internal documents, about Google's various anticompetitve conducts. Second, it provides details about the agreement made between Google and Facebook to neutralize competition from header bidding. See:

https://www.texasattorneygeneral.gov/sites/default/files/images/admin/2020/Press/20201216%20COMPLAINT_REDACTED.pdf .

layer of intermediation and its publisher ad server has more than 90 percent market share in the UK (CMA, 2020).

Building on recent reports and studies on digital advertising (especially, the CMA report (2020), the Support study to the Observatory on the Online Platform Economy (2020)[3] and Srinivasan (2020)) and insights from the economic literature on two-sided markets,[4] the report aims at shedding light on various ways Google has built up and exploited its market power in the ad intermediation industry for open display advertising[5]. Even if the report focuses on Google and devotes little space to Facebook, its analysis also applies to Facebook as long as Facebook uses strategies similar to those used by Google.[6] As the report focuses on the main exclusionary and exploitative practices Google has employed, it does not aim at being exhaustive by covering all competition issues in the open display advertising market[7] and does not provide any new empirical fact either. Providing remedies to fix the market power issue is also beyond the scope of this report although it provides some reflections on how to build a level-playing field in the ad intermediation market and on data practices which promote consumer surplus and publishers' incentive to invest in content (see the last section).

In addition to exclusionary and exploitative practices, the report covers *transparency issues in the open display advertising market.* The market is characterized by lack of transparency as publishers do not see what happens between advertisers and demand-side intermediaries (e.g. DSPs) whereas advertisers do not see what happens between publishers and supply-side intermediaries (e.g. publisher ad servers and SSPs). Opacity builds a barrier to entry by making it difficult for a stand-alone entrant intermediary to demonstrate the merits of its service, which may in turn incentivize Google to make the market less transparent.[8] Opacity makes it difficult to detect exclusionary and exploitative practices. Opacity exacerbates Google's conflicts interest, generated by its market power at each layer of ad intermediation.

Market concentration and opacity in the ad intermediation for open display advertising translate into high fees for ad intermediation. This reduces publishers' ad revenues and thereby their incentives to invest in content such as newspapers' incentives to invest in investigative journalism. Consumers are harmed because publishers invest less in content and advertisers pass-through to consumers high advertising prices.

The report shows that data and privacy are at the core of the competition issue in the ad intermediation market for open display advertising. If different ad intermediaries are vertically and horizontally interoperable and therefore advertisers can multi-home, there will be no

[3] Lechardoy, L; Sokolyanskaya, A; Lupiáñez, F (2020). Transparency in the Business-to Business Commercial Relations in the Online Advertising Market. Observatory on the Online Platform Economy, 2020, Study on "Support to the Observatory for the Observatory for the Online Platform Economy".

[4] See for instance Anderson and Coate (2005), Armstrong (2006), Caillaud and Jullien (2003), Rochet and Tirole (2003, 2006).

[5] The report, to some extent, complements the work of Scott Morton and Dinielli (2020).

[6] We focus on Google as Google's market power in ad intermediation for open display advertising is much stronger than Facebook's one even if Facebook holds a larger market share in display advertising inventory.

[7] For instance, Scott Morton and Dinielli (2020) expose 20 anticompetitive conducts of Google in the digital advertising market.

[8] Opacity can partially be a consequences of market power, where dominant players can use their economic power to impose their terms and leave advertisers and publishers in the dark regarding the costs, profits and effectiveness of placement of ads (Lechardoy et al, 2020).

entry barrier and no intermediary will have strong market power. However, the current ad intermediation market is characterized by lack of interoperability and single-homing of advertisers (and publishers). This is mainly caused by Google's decision to *hash* its ad server user IDs, which is a process of scrambling characters based on a mathematical formula (Srinivasan, 2020). Google claims that it hashes IDs for consumer privacy protection. But Google's hashing of user IDs for all rival intermediaries but for its own ones significantly reduces interoperability and makes advertisers' multihoming of DSPs difficult. This creates a tendency for market tipping by generating strong indirect network effects: single-homing advertisers tend to choose the demand-side intermediary which gives access to the largest number of publishers and reciprocally for single-homing advertisers.

Google's acquisition of DoubleClick, which was both a leading publisher ad server and a leading advertiser ad server, in 2007 was a major turning point in the open display advertising market. At that time, publishers retained ownership over data generated by DoubleClick and DoubleClick could not combine a publisher's data with other data for ad targeting. At the time of the Google-DoubleClick merger, Google made a commitment not to combine data but reversed it later on. Nowadays, Google collects browsing data from almost all third-party publishers and combines it with data from Google-owned products in order to create super profiles of consumers for ad targeting. This combination of publishers' data and Google's vertical integration into consumer-facing products generate another kind of conflicts of interest based on 'data leakage', which means that a publisher's unique audience may be 'commoditised' and used to target ads on other sites (including Google's sites). In fact, Google has strong incentives to show highly valuable advertisements on its own websites. The data leakage undermines publishers' incentive to invest in content by reducing the value of ad inventory on publishers' websites, which in turn harms consumers.

The data leakage issues raises a deep and fundamental question: what is the socially optimal scope of data combination for targeted advertising both from a static point of view and a dynamic point of view? The scope of data combination preferred by consumers and publishers may diverge from the one preferred by advertisers and ad intermediaries: the latter would prefer the maximal scope of data combination whereas it is not obvious whether consumers and publishers would prefer it. First, from a dynamic point of view, as previously described, data leakage reduce publishers' incentives to invest in content. Second, even if we neglect the investment incentive, the maximal data combination which allows Google to build super profiles of consumers may not be desirable as there are increasing concerns about platforms' manipulations of consumer behaviors by exploiting consumers' psychological vulnerabilities.[9]

The report is organized as follows. Section 2 describes the vertical chain of ad intermediaries and Google's current market shares. Section 3 describes the ad intermediation industry at the time of the Google-DoubleClick merger and shows that by a sharp contrast to the current situation, the industry was characterized by healthy competition, interoperability and

[9] Calo (2014). The concern is larger for advertising-financed platforms such as Google and social media (Zuboff, 2019, and Rosenquist, Scott Morton and Weinstein, 2020)

multihoming. Section 4 provides a simple economics of the complex open display advertising market. Section 5 describes how Google built up its market power in the vertical chain of ad intermediation. Section 6 describes transparency issues. Section 7 describes how Google exploits its market power and lack of transparency. Section 8 concludes the report by presenting some reflections on ways to build a level-playing field and to promote consumer surplus and publishers' incentive to invest in content.

2 Ad intermediaries and Google's market shares

In this section, we describe the vertical chain of ad tech intermediaries and Google's market share in each layer of the vertical chain.

2.1 Ad intermediaries

When digital advertising was in its infancy, publishers sold most of their inventory through direct deals with advertisers and media agencies (hired by advertisers), reflecting the way advertising was traditionally sold in the offline world. However, the volume of available impressions could not be perfectly estimated in an online context and therefore, publishers had to find a way to sell 'remnant' inventory, which had not been pre-sold through a direct deal. This provided a space for *ad networks*, which could buy remnant inventory from various publishers and repackage it before selling it to advertisers. The agreements between ad networks and publishers were based on pre-agreed prices.

Over time, however, there was a realization that allowing advertisers to make their bids in real time based on information about the user to whom advertising will be shown could increase the efficiency of advertising. Hence, programmatic advertising emerged, which enables automatic buying and selling of ad inventory using audience data in real time. The programmatic advertising market has experienced a rapid growth in Europe, outpacing non-programmatic advertising since 2016 and amounting to EUR 16.8 billion in 2018 (Lechardoy et al 2020, p.15).

To achieve the complicated task of selecting an ad to be served to an individual in real time and establishing the price to be paid for doing so, advertisers and publishers rely on a vertical chain of intermediaries. On the supply side, there are publisher ad servers and supply side platforms (SSPs) and on the demand side, there are demand side platforms (DSPs) and advertiser ad servers. This chain of specialized intermediaries which perform various functions for both publishers and advertisers is known as the 'ad tech stack'. In what follows, we describe the function of each intermediary in the ad tech stack.

The Publisher Ad Server plays *a central role* in digital intermediation, as it is responsible for the decision logic that determines the choice of which ad will appear at each specific piece of inventory. This does not simply involve selecting the highest bid but requires a holistic

management of real-time demand and the direct deals agreed by the publisher with advertisers and media agencies.

Publishers typically *single-home* on one ad server. Furthermore, switching cost is very high: "switching ad server is a complex and lengthy process which takes several months to complete and involves significant risks of revenue loss." (The CMA report 2020, p. 270).

The complexity of the operations carried out by publisher ad servers gives them a degree of autonomy from publishers. For example, Google's ad server has been able to impose changes to the rules publishers must follow in selling their own advertising (The CMA report, Appendix M 2020, p.M29).

Supply Side Platforms (SSP) provide the technology to automate the sale of digital inventory. They allow real-time auctions by connecting to multiple DSPs, collecting bids from them, determining the winning bidder and sending a bid back to the publishers. They also determine which buyers can bid and which data to disclose to buyers. SSPs initially tended to be separate from ad exchanges, marketplaces connecting buyers and sellers and hosting real-time auctions. The two roles (SSPs and ad exchanges) have to a large extent merged in recent years to the point that the two terms are used interchangeably.

When an SSP and a DSP are operated by different providers, a process of cookie matching, called cookie syncing, is required in order for the DSP to identify the relevant consumer information to associate to a given impression. An SSP needs to be sufficiently large to attract DSPs because cookie matching success is determined by the SSP's scale, i.e., its exposure to other impressions from the same user.

Demand Side Platforms (DSP) are services that enable advertisers and media agencies to buy advertising space from multiple SSPs. DSPs enable advertisers to store their ads, use algorithms to process user data and identify matches with the advertisers' audience, assess the value of each impression and optimize bid prices to help them buy the best matched ad slots.

One of the main roles of DSPs is to provide advertisers with the ability to target users in real time. DSPs can provide access to their own proprietary data and allow advertisers to use data through integrations with Data Management Platforms (DMPs).

Advertisers typically *single-home on one DSP for a given campaign* while large advertisers often use multiple DSPs across advertising campaigns.

Advertiser Ad Servers are used by advertisers and media agencies to store the ads, deliver them to publishers, keep track of this activity and assess the impact of their campaigns by tracking conversions.

The next figure describes a simplified ad tech stack. As advertiser ad servers play a less important role than the other intermediaries, in our analysis, we will focus on publisher ad servers, SSPs and DSPs. However, note that Google Ads, which are used by most small

publishers for search advertising, perform both the function of an advertiser ad server and a DSP.

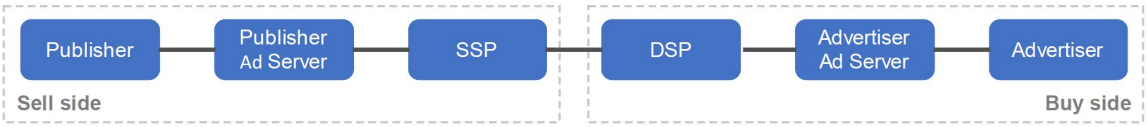

Figure 1. A simplified ad tech stack (Source: CMA, 2020)

A typical process of selling advertising inventory works in the following way. When a user opens a webpage (or uses an app), the publisher's ad server sends a bid request to SSPs for the advertising space available on the web page. In turn, the SSPs send bid requests to multiple DSPs. DSPs evaluate the advertising opportunity based on the objectives of the campaigns of their advertisers and send bids to the SSPs. SSPs then rank the bids received based on price and on priority levels that may have been set by the publisher and send their winning bids to the publisher. Finally, the publisher ad server compares bids received from SSPs, together with any pre-existing direct deals between the publisher and specific advertisers, and decides which ad to serve on the webpage.

For later analysis, we here emphasize the lack of data interoperability, which is generated by the fact that each intermediary uses a different cookie ID. First, if a DSP and a SSP are operated by different providers, a process of cookie matching is required. This process is prone to failure and can result in approximately 30% failed matching. Second, a main cost of using multiple DSPs comes from the lack of common ID between different technologies, which makes it difficult to manage *frequency*, which refers to the number of times a user is shown an advertising over a period of time. For instance, the ID Google's SSP shares with its own DSP is different from the ID it shares with a rival DSP. Therefore, an advertiser using both DSPs may fail to know that the two different IDs are associated with the same user and hence end up bidding twice for the same user through different DSPs.

2.2 Google's acquisitions and market shares in ad intermediation

Google made a number of acquisitions in ad tech industry. Google's most significant acquisitions in ad tech include:

- DoubleClick (April 2007) – Publisher ad server and ad exchange; formed the basis of Google's ad server and AdX (now Google Ad Manager).
- AdMob (November 2009) – Technology for serving ads on apps; formed the basis of Google's AdMob product.
- Invite Media (June 2010) – Media buying optimization technology for the display advertising market; evolved into Google's main DSP product, Google DV360.
- AdMeld (June 2011) – Supply Side Platform; integrated into Google AdX.

- Adometry (May 2014) – Analytics and attribution provider; integrated into Google Analytics to provide improved attribution services.

For later analysis, we also note that Google acquired YouTube in November 2006.

Because of the above acquisitions and Google's leverage of data, advertising inventories and speed advantage, Google is currently the dominant player at each vertical layer of the ad tech stack. We below report Google's market shares in the UK provided by the CMA (2020). The publisher ad server market is monopolized by Google as Google Ad Manager accounts for more than 90% of the display ads served in the UK. Google has 50-60% share in the SSP market in the UK. Google's DSP DV360 has a 30-40 % market share. Google operates a DSP through Google Ads, which has a 10-20 % market share. Hence, the combined market share in DSP becomes 40-60% in the UK. The advertiser ad server market is highly concentrated and Google accounts for approximately 80-90 % of the ads served to UK users.

The next figure summarizes Google's marker shares in the ad tech stack.

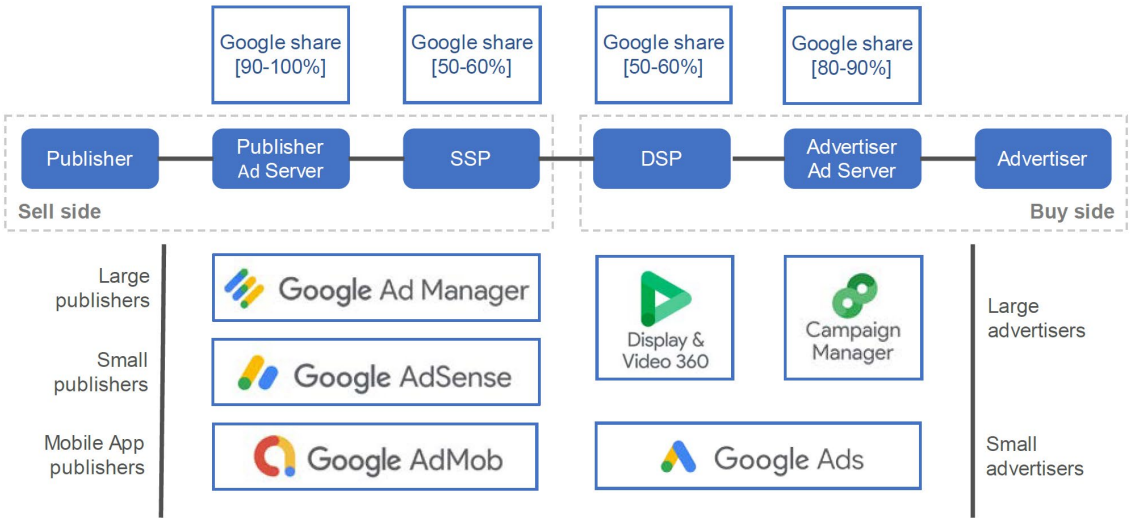

Figure 2: Google's role in advertising intermediation (Source: CMA, 2020)

We end this section by describing what is called *"ad tech take",* which represents the difference between what advertisers pay and what publishers earn from digital advertising. According to the estimation of the CMA (2020), on average in 2019, publishers received at best 65% of initial advertising revenue that was paid by advertisers (i.e. the overall 'ad tech take' was at least 35%). The CMA also found that, in transactions where both Google Ads and Ad Manager (AdX) are used, Google's overall take rate is approximately 30% of advertisers' spend.

3 The ad intermediation industry at the time of the Google-DoubleClick merger

Even if the ad intermediation market is highly concentrated these days, it was far from the case at the time when Google acquired DoubleClick in 2007. At that time, the ad intermediation market was characterized by healthy competition, multihoming and interoperability. In particular, the data practices were so different from those of nowadays: publishers and advertisers retained ownership of their data collected by DoubleClick. We below briefly describe how the display ad intermediation market worked at that time, what was the standard data practices and what was the main concern regarding the merger.

At the time of the merger, in non-search advertising, Google's market share was limited and in particular was zero in display ad because Google offered only intermediated sales through its AdSense network and these intermediated sales concerned almost exclusively contextual ads and no display ads (EC 2008, p. 30). DoubleClick was the leading provider of display ad serving technology for publishers and advertisers. On the publisher side, it was the leader in Europe with 40-50 % market share and on the advertiser side, each of DoubleClick and aQuantive/Atlas (acquired by Microsoft as a reaction to Google's acquisition of DoubleClick) had 35% market share in Europe (EC 2008, p.35). Note that targeting advertising based on web browsing data (called, behavioural targeting) was an emerging technology, which neither DoubleClick nor Google yet developed, unlike a number of competing firms.

Regarding the competitive situation in the ad serving market, the EC found that DoubleClick faced strong competition from a number of rivals and thus would not be able to exercise any significant market power (EC 2008, p. 77). Regarding the concern about leveraging DoubleClick's leading position in ad serving to the market for ad intermediation, the EC found evidence that there was significant entry and competition in online ad intermediation as well as evidence on the prevalence of multihoming and the ability of ad networks to compete even with a relatively small number of partners on the publisher side (EC 2008, p. 80). The prevalence of multihoming suggests that the participation by a publisher or an advertiser to an ad network does not imply that they are unable or unwilling to participate in another ad network. The median number of ad network participation by European publishers was 2 (while it was 5 in the United States). The multihoming is also enabled by the interoperability of the ad serving technology allowing publishers and advertisers to provide instructions across several networks. As a consequence of multihoming and interoperability, many ad networks and ad exchanges developed in parallel and were growing.

A major concern regarding the merger was about combining Google's search data with DoubleClick's browsing data to enable highly targeted advertising and eventually to tip both the search ad and the display ad markets. For instance, according to the dissenting FTC commissioner Pamela Jones Harbour, who was prophetic in predicting the outcomes of the merger, combining both companies' vast troves of data about search and browsing enables highly targeted advertising and exacerbates network effects such that, "the Google/DoubleClick combination is likely to "tip" both the search and display markets in Google's favor, and make it more difficult for any other company to challenge the combined firm." (FTC 2007, p.5).

However, the EC found that DoubleClick was contractually prohibited from using the data of individual publishers or advertisers to improve targeting for other publishers or advertisers and that there was no indication that the merged entity would be able to impose contractual changes on its customers to allow such 'cross-use' of their data in the future. For instance, regarding the data generated by DoubleClick's publisher ad server, EC wrote *"This data contractually belongs to the publisher whose website it relates to. Presently, DoubleClick is limited in the use it can make of this data. In particular, it cannot be made available to other publishers or advertisers or be used to improve ad targeting for other publishers or advertisers."* (EC 2008, p.52)

In a similar vein, Google's chief legal officer assured the U.S. Congress that DoubleClick *"data is owned by the customers, publishers and advertisers and DoubleClick or Google cannot do anything with it."* (U.S. Senate, 2007). Both the FTC and the EC approved the merger without imposing any condition. However, the concerns raised by the dissenting commissioner Harbour became the reality.

4 Economics of the open display advertising market

This section provides a simple economics of the complex open display advertising market[10] and thereby offers an economic framework to understand Google's exclusionary and exploitative practices presented in subsequent sections.

Economists use the concept of *competitive bottleneck* (Armstrong, 2006; Armstrong and Wright, 2007) to describe the market of ad-financed publishers. For instance, in the open display advertising market, a large number of publishers compete to attract consumers to spend time on their websites/apps and monetize their attention by selling display advertising. At a given time, the only way for advertisers to reach a given consumer is to buy ad space from the website/app which the consumer is visiting at the time. In this sense, the website/app is a bottleneck of the consumer and exercises this bottleneck power vis-à-vis advertisers by selling the ad inventory typically through a real-time auction. However, publishers compete to capture consumer attention by investing in content. In other words, the theory of competitive bottleneck predicts that publishers extract large surplus from the advertiser side but dissipate an important part of the extracted surplus to attract consumers by investing in content.

A key assumption in this theory of competitive bottleneck is multihoming of advertisers such that any publisher has access to a relatively large number of advertisers. This is consistent with a market of competitive and *interoperable* ad intermediaries. Then, advertisers would use multiple demand-side platforms (DSPs) and hence publishers would be able to reach many advertisers even if they single-home when choosing publisher ad servers. However, a main feature of the current ad intermediation market is lack of interoperability, in particular due to the lack of common consumer IDs. This induces advertisers to single-home when they choose DSPs. When both publishers and advertisers single-home among ad intermediaries which are not interoperable, indirect network effects play a major role such that publishers (respectively, advertisers) want to choose the supply-side ad intermediary (the demand side-intermediary) which allows them to access a larger number of advertisers (respectively, publishers). This in turn creates a tendency for market tipping as small intermediaries have difficulty to attract publishers and advertisers.

In fact, Google leverages its data, inventory and speed advantage to its DSPs and heavily subsidizes its publisher ad server. Furthermore, Google uses self-preferencing to channel advertisers' demand captured by its DSPs to its SSP and publisher ad server and to use the vast amount of ad inventory controlled by its publisher ad server to favour its SSP and its DSPs. As a result, Google's vertically integrated ad stack is dominant at each layer of ad intermediation and is monopolist in the publisher ad server market (at least in the UK). In addition, the fragmented nature of ad intermediation generates double marginalization problems, inducing each in a pair of vertically adjacent intermediaries to charge too high a fee relative to the fees chosen by a vertically integrated one. The lack of competition and

[10] Regarding economic analysis of search advertising, see Decarolis, Goldmanis and Penta (2020) and Decarolis and Rovigatti (2019).

fragmentation in the ad intermediation tend to increase ad tech take. This tendency is further amplified by the opacity of ad intermediation. High ad tech take implies that a large chunk of advertisers' expenditure is captured by ad intermediaries, which reduces publishers' ad revenues and thereby their incentives to invest in content.

Another implicit (but important) assumption in a standard theory of competitive bottleneck is that each publisher has a control over its data. For instance, if a consumer reads Le Monde's article reviewing a new generation of smartphones, only Le Monde can make use of such information to show a targeted advertising to the consumer. As we have seen previously, this was the data practice at the time of the Google-DoubleClick merger. However, nowadays, Google collects browsing data from almost all third-party websites/applications and combines it with the data from Google-owned products to create super profiles of consumers for ad targeting. This data combination, together with Google's vertical integration into consumer-facing products, generates a conflict of interest based on *data leakage*. Data leakage means that a publisher's unique audience may be 'commoditised' and used to target ads on other sites, which undermines the value of advertising inventory on the publisher's own website. If le Monde uses Google's publisher ad server, then its data will be combined with other sources of data by Google for ad targeting at other websites. In the context of the above example, Google has an incentive to show an ad featuring a new iPhone to the consumer who read Le Monde's review article when she/he visits a Google's website or another third-party website since by doing so Google obtains at least the ad tech take. In fact, Google has a much stronger incentive to show highly valuable ads on Google-owned websites than on third-party websites since in the first case, Google receives 100% of what is paid by advertisers while it gets only its ad tech take in the second case.

Consumers are harmed if publishers have lower incentives to invest in content due to high ad tech take or data leakage. Consumers are also harmed if advertisers pass through high ad tech take by raising the prices of their products. Consumers, publishers and advertisers should prefer lower ad tech take and in this sense their interests are aligned regarding ad tech take. By contrast, their interests may be in conflict regarding data leakage; advertisers should like data leakage as it increases both the supply of targeted advertising and the level of targeting.

5 How did Google build up its market power in the display ad intermediation industry?

Historically, Google was late to enter the programmatic advertising market and, when it launched an exchange in the fall of 2009, it faced a lot of competition. The same was true about Google's entry into DSPs: in 2009, Google owned Google Ads (then called AdWords), but Google had not yet launched a DSP and plenty of firms competed in that market segment. Despite "playing catch up", by around 2013, Google's exchange overtook the competition to become the largest trading venue for ad space globally. Shortly afterwards, Google's DSP, DV360, also eclipsed the competition to become the most used in the market (Srinivasan, 2020). How did Google build up its market power in the display ad intermediation industry?

5.1 Reducing interoperability by hashing consumer IDs

Google restricted, for consumer privacy reasons, how any party other than Google could access its ad server user IDs by *hashing* the IDs, which is a process of scrambling characters based on a mathematical formula. At the same time, Google permitted its own exchange and DSPs (Google Ads and DV360) to access them by default. In this way, Google broke the universal cookie model that was the norm (Srinivasan, 2020).

This change to hashing user IDs for everyone other than Google reserved an information advantage for Google while reducing interoperability and making multihoming difficult.

First*, it reduces vertical interoperability* at any adjacent layers in the chain of intermediaries (i.e., between a Google publisher ad server and non-Google SSPs and between a Google SSP and non-Google DSPs). For instance, Google's exchange shares users' DoubleClick IDs with the Google-owned DSPs but sends a different hashed ID to a non-Google DSP. This information asymmetry distorts competition. To identify users associated with ad space for sale on Google's exchange, non-Google DSPs must go through cookie syncing between Google's hashed IDs and new IDs they assigned, which is inherently inefficient.

Second, *it reduces horizontal interoperability* between different DSPs and makes multihoming of DSPs by advertisers difficult. As a Google DSP and a non-Google DSP operate on different user IDs, implementing frequency caps (ensuring that the same user does not see the same ad too often) becomes very difficult when using multiple DSPs for a given campaign. Furthermore, Google shares different hashed IDs across different rival DSPs, further reducing interoperability among non-Google intermediaries.

We have seen that most publishers single-home in terms of publisher ad server. This together with single-homing of advertisers at the DSP level and the lack of interoperability creates strong indirect network effects. Publishers tend to choose an ad server which provides them with large access to advertisers and advertisers tend to choose a DSP which provides them with large access to publishers. This creates a market dynamics for tipping toward Google's vertically integrated ad tech stack.

5.2 Data combination

At the time of the Google-DoubleClick merger, DoubleClick was contractually prohibited from combining a publisher's data with data of other publishers to improve targeting. Google told the U.S. Congress that "Google cannot do anything with" the data as data ownership rested in publishers and advertisers. In addition, Google told the Congress that it would not combine the data collected on internet users via DoubleClick with the data collected throughout Google's ecosystem (US House of Representatives 2020, p.209).

However, Google reversed its commitment as its market power grew. In 2012, Google amended additional terms and conditions to obtain permission to merge data from the DoubleClick buyside and sell-side division with data from other Google business divisions, including Google's exchange division and Google's proprietary divisions Search and YouTube. In 2016, Google amended its consumer privacy policies again, this time obtaining permission to combine DoubleClick data with data Google separately has about consumers' identity (Srinivasan 2020, p.61).

Although Google CEO defended the reversal in its commitment by claiming "Today [we] make it easy for users to be in control of their data" (US House of Representatives 2020, p.210), Google's increasing degree of data combination reflects its increasing market power, as is stated by Representative Val Demings at the Antitrust Subcommittee's sixth hearing in 2020: *"So, in 2007, Google's founders feared making this change because they knew it would upset their users, but in 2016, Google didn't seem to care. Mr. Pichai (the Google CEO), isn't it true that what changed between 2007 and 2016 is that Google gained enormous market power."* (US House of Representatives 2020, p.210).

Google's combination of publishers' data with other data to generate super profiles of consumers creates the previously mentioned "data leakage" problem and can seriously undermine publishers' incentive to invest in content. Publishers' loss of data control got further magnified recently. At the beginning of May 2018, just weeks before the GDPR came into effect, Google released its updated online terms and conditions to cover changes to its advertising services. The terms describe Google as a co-controller of data and require publishers to get consent on its behalf, Google becoming de facto controller of the data with the ability to combine data collected on publishers' websites with data collected across its own operated services. Publishers consider that these changes were made in a non-negotiable way and that they had no choice but to accept this update. (Appendix S of the CMA report 2020, p. S8). In 2018 Google started obtaining access to users' readership information on third-party sites and apps directly from consumers' use of the Chrome browser, circumventing entirely the need to negotiate for these rights with third parties (e.g., publishers and advertisers) (Srinivasan 2020, p.61).

5.3 Leveraging data

Advertisers highly value the ability to offer personalised advertising based on consumers' individual data. According to the CMA (2020)'s study of data generated by Google's

Randomised Controlled Trial (RCT) of display advertising, UK publishers earned around 70% less revenue overall when they were unable to sell inventory using personalised advertising (i.e. when cookies were not available) but competed against others who could.[11]

Google has a massive amount of consumer data from various sources, which it combines to build detailed super profiles of individuals to make inferences about the types of products and services that they are likely to purchase. By making its data available only within its walled garden, Google leverages its data to its own ad intermediaries. In addition, hashing user IDs for everyone other than Google amplifies the power of this data leverage. The data leverage is strongly manifested at the DSP layer (DV360 and Google Ads) since the main function of a DSP is to enable ad targeting, which is facilitated by detailed profiling based on massive data.

We below describe various sources of data for Google.

- Google obtains the first-party data from its own consumer-facing services and Android mobile devices. Google provides more than 53 consumer-facing services and products in the UK, including Google Search, and gathers data through them (Appendix F of the CMA report, 2020, p. F8). The data contains user information, information about device, apps and browser used, consumer activities and location. Search data is very valuable because it allows advertisers to target consumers who are actively looking for specific products and services. Google has a great advantage in relation to location data, which it gathers systematically from mobile devices running Android.
- Google collects data directly from third-party websites and apps by providing them with analytics tools such as Google Analytics, advertising services such as Google AdSense. Google tags (eg Google Analytics, Google Ads and Floodlight tags) are found on over 80% of the most popular websites (Appendix F of the CMA report, 2020, p. F13). This is not matched by any other platform: Facebook has the second highest prevalence of tags, and it covers between 40-50% of the most popular websites.
- Moreover, Google combines all these data from many different sources to build a detailed super profile of each consumer, with the exclusion of services for which Google is a 'data processor' or otherwise restricted from merging data for ads (eg Google analytics). In particular, the availability of log-in data allows Google to identify all the computers and mobile devices associated with a user, associating all the data about the user to a single user ID. (CMA, 2020, p. 282).

We close this subsection by reviewing Google's leverage of its dominance in web browser market. Google Chrome has a market share of approximately 60% in Europe, in part due to being preinstalled on Android devices.[12] Google can use its dominance in the browser market to impose changes that adversely affect rival ad intermediaries, such as blocking of third party cookies and proposing new standards such as "trust tokens" and a "privacy sandbox". In January 2020, Google announced that it would phase out third party cookies in its Chrome

[11] See Appendix F of the CMA report for more details.

[12] https://gs.statcounter.com/browser-market-share/mobile/europe

browser. [13] Thanks to its greater knowledge about users relative to competing ad intermediaries, blocking third-party cookies would benefit Google vis-à-vis rival intermediaries. Google is active in developing web-standards to replace third-party cookies. Google could use Chrome's large market share to implement replacements for third party cookies which benefit its advertising services at the expense of others.

5.4 Leveraging ad inventory

Google leverages its YouTube ad inventory and search ad inventory to its ad tech stack. When Google initially purchased YouTube, its inventory was available for all DSPs to use. Then, in 2015, Google closed YouTube and made it accessible only at its DSPs (CMA, 2020, p. 206). The value of advertising on its YouTube platform corresponds to 15-20% of the value of the entire open display advertising in the UK (Appendix M of the CMA report, 2020, p. M101-102). As advertisers use a single DSP for a given campaign in order to manage frequency, this tying induces any advertiser including YouTube in its campaign to use a Google's DSP for the entire campaign.

Google controls roughly 90% of search ad inventory and leverages its marker power in search ad inventory into display advertising by facilitating interoperability between its search ad service and its own DSP, Google Ads, which is the main route through which advertisers, especially smaller ones, buy Google's search inventory. The importance of search inventory for advertisers makes Google Ads an extremely popular buying platform, with a very large advertiser base. Advertisers using Google Ads for their search campaigns can easily extend the scope of their campaigns to display advertising. Indeed, Google Ads includes both Search and Display Network by default when an advertiser sets up a campaign on Google Ads (Appendix M of the CMA report, 2020, p. M106).

Given that most advertisers single-home for a given campaign, Google's leverage of data and inventory significantly increases the market share of Google's DSPs.

5.5 Cross-subsidization

A stand-alone ad intermediary which is not vertically integrated cannot charge fees below costs. By contrast, a vertically integrated ad intermediary, which is present at each layer of intermediaries, has an incentive to subsidize a layer to tip the market as it can recoup the loss with higher profits from other layers.

Since the publisher side is the bottleneck side and publishers single-home on a publisher ad server, a publisher ad server plays *a central role* in ad intermediation: it is responsible for the decision logic that determines the choice of which advert will appear at each inventory. Following the acquisition of DoubleClick and its ad server in 2008, Google reduced the price of its publisher ad server by a factor of ten (Appendix M of the CMA report, 2020, p. M64). Such pricing pressure made the provision of publisher ad server difficult to sustain as

[13] This followed Apple and Mozilla who also started to phase out third party cookies.

a standalone business. Google's low pricing and aggressive marketing strategies led to the monopolization of the publisher ad server market: Google Ad Manager accounts for more than 90% of the display ads served in the UK.

As the complexity of the operations carried out by a publisher ad server gives it a degree of autonomy from publishers, Google can use monopoly power to impose changes to the rules publishers must follow in selling their own advertising.

5.6 Latency

Speed shapes competition among DSPs on ad exchanges. After an SSP sends bid requests, DSPs have a time limit of between 100 to160 milliseconds (one to two-tenths of a second) to submit their bids (Srinivasan, 2020, p. 15) and responses received after the time limit deadline are excluded from the auction.

If Google operates both a SSP and a DSP, it can locate them close by geographically, reducing the time needed for information to travel between the two. Colocation can reduce the frequency of exclusion for the Google-owned DSPs from 1-in-4 to zero as latency issues can prevent advertisers from successfully submitting a bid up to 25% of bid requests (Srinivasan 2020, p.34). Colocation provides Google-owned DSPs with a second benefit: they have more time to query additional data about the user to better determine the value of ad space for sale (Srinivasan 2020, p.34). By contrast, a rival DSP submitting a bid to the Google SSP suffers from double handicaps: latency from the lack of colocation and latency from cookie syncing.

5.7 Further Strengthening Indirect Network Effects through Self-preferencing

Note first that self-preferencing can be both exclusionary practices (presented in this section) and exploitative practices (presented in Section 7). We have seen that Google publisher ad server has above 90% market share in the UK. We have also seen that hashing consumer IDs, leveraging data, inventory and speed advantage gave an enormous advantage to Google's DSPs. By engaging in self-preferencing, Google further reduces interoperability, strengthens indirect network effects and channels its buyer side market power to the supply side and vice versa.

- Google can channel its DSPs' demand to its SSP (AdX) by engaging in self-preferencing. A lot of the demand from Google's DSPs, particularly from Google Ads, is channelled through AdX. For example, between September 2018 and August 2019, the aggregate value of the impressions won by Google Ads through AdX was several times that of impressions won through other third-party exchanges. (Appendix M of the CMA report 2020, p. M108). Note however that it is hard to figure out how much of such demand channelling is due to self-preferencing as sharing common user IDs and lack of latency give advantage to Google-owned DSPs when submitting bids to AdX.
- Google limits access of third-party publisher ad servers to AdX and can thereby leverage its market power on the demand side (channeled to its SSP) to its own

publisher ad servers. As AdX does not participate in header-bidding (see description in next point), AdX demand cannot be easily placed in real-time competition with that from other SSPs.

- Google's publisher ad server can self-preference its SSP by conferring the last look advantage. Google's publisher ad server, formerly DoubleClick for Publishers (DFP), used Dynamic Allocation under which Google's exchange AdX was the only SSP able to insert its real-time demand within DFP. Under Dynamic Allocation, DFP established a 'floor price' based on estimated bids of non-Google SSPs and then sent a bid request to its own exchange (AdX). Estimated bids represent the bids DFP expected them to submit once called and were based on the average past performance of each SSP. AdX would run its real-time auction and secure the impression if it could submit a bid above the price floor while all other SSPs were stuck with their estimated bids. From 2015, a new technology, called header bidding, began to be used by publishers to allow all SSP partners the chance to compete against each other on the basis of their real-time demand. Google, however, decided not to participate in header bidding. This decision, combined with the working of Dynamic Allocation, resulted in AdX maintaining an advantage, called 'last look' advantage, over other SSPs where ads are delivered through DFP. When an impression is available, the user's browser first calls the publisher's SSP partners, which submit their bids to the header bidding auction. The browser then contacts DFP, which then sends a bid request to AdX with its price floor equal to the highest bid from the header bidding auction. As a response to header bidding, Google introduced Exchange Bidding, later renamed Open Bidding, a unified auction run by DFP where AdX competes in real-time with third-party ad exchanges, but where Google maintains its last look advantage.[14]

[14] In 2019, Google transitioned to a Unified first-price auction, where its publisher ad server now runs a single auction between the following demand: DSPs connecting to AdX, third-party ad exchanges participating in Open Bidding, direct deals and the winner header bidding bid. The move to unified auction in which Google both runs the auction and participates in it, provides Google with vast bidding data from its rivals and opportunities to favour its own exchange (Lechardoy et al., 2020).

6 Lack of transparency in display ad intermediation

The lack of transparency is particularly severe in the open display advertising market where publishers and advertisers rely on a vertical chain of third-party intermediaries to manage the process of real-time bidding and ad serving but cannot observe directly what the intermediaries are doing or, in some cases, how much they are being charged. Note that the complexity of running real-time auctions and the fragmentation of ad intermediation also contribute to the lack of transparency. We can distinguish three kinds of transparency issues.

6.1 Transparency of fees

Market participants typically do not have visibility of the fees charged along *the entire intermediation chain* and many are concerned that this limits their ability to make optimal choices on how to buy or to sell inventory, reducing competition among intermediaries.

Publishers have visibility on the commissions contractually agreed with SSPs but do not observe the fees DSPs (and other providers along the intermediation chain) charge to advertisers buying their inventory. It may be difficult for publishers even to know which advertisers are bidding for their inventory since SSPs rarely provide auction level data to publishers. This lack of transparency about the identity of the bidders and intermediaries' fees may therefore limit publishers' ability to negotiate directly with advertisers. This limits the competitive pressure faced by DSPs as direct deals are an alternative to selling inventory through intermediaries (CMA, 2020, p. 298).

Symmetrically, advertisers can have transparency on the fees for the DSP part of the chain but not on the fees levied by SSPs. Given that publishers decide which ad should be served based on bids net of SSP fees, visibility of these fees could make it easier for advertisers to select the cheapest path to secure specific inventory. Hence, this lack of transparency may result in reduced competition between SSPs in attracting advertisers (CMA, 2020, p. 298).

6.2 Transparency related to auction rules and algorithm

Programmatic advertising is also considered opaque for the little auditable information available on the algorithms used and the quality of the matching process. The reliance on black box decision making makes it difficult for market participants to understand or challenge the decisions made, in particular how auctions are carried out and auction outcomes determined (Lechardoy et al., 2020).

Many small publishers rely on automated bidding service of Google Ads, which has the potential to substantially improve advertising performance on behalf of advertisers. However, automated bidding is a 'black box' as the algorithms can be highly complex, relying on machine learning processes and incorporating various informational signals that the advertiser does not have access to. This is further complicated by the fact that Google carry out automated bidding on behalf of multiple advertisers competing in the same auctions. (Appendix Q of the CMA report, 2020, p. Q7).

6.3 Transparency related to ad verification and attribution

To make informed choices that can drive competition, advertisers need to be able to assess and evaluate the quality of the product they are purchasing. Two important elements of this process are:

- verification: checking the viewability of the advert and the context in which it was displayed, including identifying potential ad fraud; and
- attribution: tracking what actions the consumer took after being exposed to the advert.

Although both Google and Facebook work with a number of approved third-party verification providers, they restrict access to the detailed data in respect of verification for their owned-and-operated advertising inventory. Without access to the underlying raw data and the ability to have full independent verification, advertisers and media agencies have the perception that Google and Facebook have the freedom, in effect, to 'mark their own homework' (CMA, 2020, p. 410). This generates an incentive for them to overreport. For example, in September 2016, Facebook acknowledged that it had overreported the average 'watch time' metric for videos. It was reported that the extent of the overstatement was estimated to be between 60-80% for around two years (Appendix O of the CMA report, 2020, p. O12).[15]

There are also concerns about ad fraud. 'Ad fraud' refers to the fraud committed in the delivery of advertising and includes a range of practices used to misrepresent advertising impressions, clicks or conversions. The result is that advertisers are charged for advertising that does not actually reach their intended audience. Ad fraud is more prevalent in open display advertising. According to the World Federation of Advertisers (WFA, 2016), ad fraud will grow globally up to between 10% and 30% of the digital ad spend by 2025, oscillating between USD 50-140 billion (EUR 44.7-127 billion). According to the WFA (2016), when there is ad fraud, the 40 percent of what is paid by advertisers goes to the perpetrator whereas the remaining 60% to the ad intermediation industry. As the ad intermediation industry is the main beneficiary of ad fraud, its incentive to combat ad fraud can be weak.

'Walled garden' platforms can track users across different devices and sessions, enabling them to attribute consumers' actions more accurately than third parties. Some actions of the large platforms have made third party attribution more difficult. For example, in 2018 Google made the decision to prevent DoubleClick user IDs being accessed by ad buyers. This made it more difficult to compare ad performance between ads purchased through the Google ad tech stack and ads purchased through other intermediaries. This change has also made independent attribution (ie attribution using tools other than Google products such as Google Ads Data Hub or Google Analytics360) much more difficult (CMA, 2020, p. 302).

[15] Recently, Facebook told to advertisers that its "conversion lift" tool overestimated some campaign results for 12 months. https://www.wsj.com/articles/facebooks-latest-error-shakes-advertisers-confidence-11606346927

7 Google's exploitation of its market power and the lack of transparency

Google has strong market power at each layer of ad intermediation and therefore is subject to conflicts of interest. The lack of transparency in ad intermediation exacerbates this conflict of interest and induces it to engage in exploitative behaviours such as self-preferencing (Section 5.7). There is neither regulation nor public oversight of Google's conflicts of interest.

This point was raised by Congresswoman Jayapal at the Antitrust Subcommittee's sixth hearing in 2020 when questioning Google CEO Sundar Pichai: *"So Google is running the marketplace, it's acting on the buy side, and it's acting on the sell side at the same time, which is a major conflict of interest. It allows you to set rates very low as a buyer of ad space from newspapers, depriving them of their ad revenue, and then also to sell high to small businesses who are very dependent on advertising on your platform. It sounds a bit like a stock market, except unlike a stock market, there's no regulation on your ad exchange market" (US House of Representatives 2020, p.207)*

7.1 Arbitrage between two sequential auctions of an impression

This arbitrage is exactly what Congresswoman Jayapal was referring to in the above quote and takes place in the context of sequential auctions to sell an impression. Then, lack of transparency may induce an intermediary (SSP or DSP) to engage in an arbitrage by buying an impression at one price and selling it at a higher one without its customers being aware of the magnitude of the difference. Some evidence of arbitrage is provided by a study of PwC on behalf of ISBA (2020). The study was unable to attribute 15% of advertisers' spend (corresponding to approximately 30% of the difference between advertisers' spend and publishers' revenues for matched impressions) as in many cases the winning bid recorded by the DSP did not match the gross revenue recorded by the SSP. According to the CMA (2020), the difference between the CMA's estimation of ad tech take and the estimation by PwC is almost entirely explained by this so-called 'unknown delta'. The result suggests that 'hidden fees' might account for a significant fraction of the cost of intermediation.

The ability and incentive to engage in such arbitrage are very strong for Google for various reasons. It is dominant at each layer of ad intermediation. When a Google-owned DSP makes a bid into a Google-owned SSP, it enjoys a number of advantages relative to competing DSPs such as a larger number of advertisers, a larger amount of high-quality data for targeting, data interoperability from sharing common consumer IDs, lack of latency etc. Therefore, it is very likely that the winning bid from the Google-owned DSP will win the auction in the Google-owned SSP and hence Google has a strong incentive to engage in the arbitrage.

The conflict of interest is particularly strong in the case of automated bidding service, which most small publishers using Google Ads rely on. As Google Ads' demand is typically channelled

to Google's SSP (AdX), Google has an incentive to raise prices paid by advertisers to profit from the arbitrage.

7.2 Arbitrage across different impressions of the same consumer due to data leakage

If the previous arbitrage occurs for a given impression, this second type of arbitrage occurs across impressions on different websites visited by a given consumer. There is a concern that access by DSPs to browsing data from publisher sites may undermine the value of that data to the publishers themselves through the previously mentioned 'data leakage'. DSPs generally obtain permission from publishers to place tracking cookies on their websites, so that they can observe user browsing behaviour. User browsing data is pooled by DSPs with other data about the same user from various sources to generate a rich user profile for personalised ad targeting. These profiles are used by DSPs for targeting ads to a user across multiple publisher websites and apps. For instance, DMG Media stated, 'it is still of concern that our loyal and highly scaled audience, built through significant effort and investment, may be utilized to help power ad campaigns across low quality arbitrage websites'. (Appendix M of the CMA report, 2020, p. 78)

Among all ad intermediaries, Google has the strongest ability and incentive to engage in this type of arbitrage. First, the amount of browsing data it collects from third-party publishers is by far the largest because of its monopolistic position in the publisher ad server market. Second, the availability of log-in data allows Google to identify all the computers and mobile devices associated with a user, associating all the data about the user to a single user ID. Third, Google owns a large amount of ad inventories and manages almost all ad inventories of third-party publishers through its ad server. In fact, Google is subject to another kind of conflict of interest which arises because it is vertically integrated into consumer-facing products: it has a strong incentive to show highly valuable ads on Google-owned sites since then it obtains the totality of what is paid by advertisers.

Note that data leakage is not limited to the individuals whose data are collected by Google: Google can find doppelgangers[16] of the individuals (i.e. those whose profiles are very similar to the individuals) and show them the same ad.

7.3 Using its search dominance to impose standards like Accelerated Mobile Pages (AMP) to deprive publishers of user data

The AMP issue is raised both in the CMA (2020) report and the report of U.S. House of Representatives (2020). The AMP standard allows fast loading of articles in mobile environment. However, Google induces (or coerces) publishers to adopt the AMP by giving AMP articles prominent positions in its mobile search result pages. For instance, only news articles meeting the AMP standard can appear in "Top Stories" carousel, which attracts a

[16] Stephens-Davidowitz (2017)

majority of users' attention. In addition, Google displays a "lightning" icon besides the link for AMP articles, to indicate that their pages can be loaded fast.

There are two main concerns related to the AMP. First, AMP articles are cached by Google and hence Google can collect data on consumer's browsing activities on AMP articles. (See Appendix S of the CMA Report 2020, p. 3 and p. 17).[17] This also explains why AMP articles load fast. Second, the AMP standard restricts the use of JavaScript, which is precisely the code that publishers need to use to make work the (client-side) header bidding, which is a popular technology allowing a publisher to enable several SSPs to compete on real-time basis (Srinivasan 2020, p. 49).

[17] See Jeon and Yan (2020) for an economic analysis of AMP focusing on data leakage and its impact on newspapers' incentive to invest in journalism.

8 Some reflections on how to build a level-playing field in ad intermediation

Even if proposing remedies is beyond the scope of this report, the analysis of the report provides us with elements for reflections on how to restore competition in the ad intermediation market.

Among various strategies used by Google, the report has highlighted Google's use of consumer privacy to strengthen its market power: Google hashed user IDs for privacy protection and justified the reversal of its commitment not to combine data by consumer consent. It is therefore important to tackle the question of to what extent there is any trade-off between consumer privacy and competition in the digital advertising market. For instance, to what extent has the GDPR helped Google and Facebook entrench their market power in the digital advertising market?

To create a level-playing field in which a stand-alone intermediary without scale can freely enter and compete on the merit of its service, it is imperative to restore interoperability. Restoring data interoperability may require introducing common consumer IDs across all ad intermediaries. Encouraging adoption of common standards would increase technical interoperability. If there is no level-playing field and hence ad intermediation involves high ad tech takes, consumers are harmed because publishers may invest much less in content and advertisers may pass-through to consumers high ad intermediation fees.

The analysis of the report also suggests that it could be appropriate to evaluate the need for a possible public intervention as regards the current data practices in the open display ad market both from a static and a dynamic point of view. Currently, Google collects browsing data from almost all third-party publishers and combines it with data from Google-owned products (including Google search) in order to create super profiles of consumers for ad targeting. Does such unlimited data combination maximize static efficiency and dynamic efficiency? Regarding static efficiency, maximal data combination may generate efficiency by improving matching between publishers' ad inventories and advertisers. However, how an increase in ad targeting affects consumer surplus is a largely open question. In particular, there is an increasing concern about platforms' manipulations of consumer behaviour: when a platform knows much better about a consumer than the consumer knows about herself, the platform can manipulate the consumer's behaviour by exploiting vulnerabilities in her psychology (Calo, 2014). The concern is stronger for advertising-financed platforms such as Google and social media (Zuboff, 2019, and Rosenquist, Scott Morton and Weinstein, 2020).

The dynamic efficiency concern in terms of publishers' incentive to invest in content can induce public authorities to think about ways to restore publishers' control of data with respect to ad intermediaries, as it was the norm at the time of the Google-DoubleClick merger. Publishers' data are fruits of their investment in content. As long as consumer privacy is respected, publishers should be able to exercise full control over their data. Data leakage,

through free-riding of Google and other intermediaries, may significantly undermine their incentives to invest in content. Given that Google has monopoly power in the publisher ad server market, Google can impose its terms and conditions on publishers to facilitate its collection and combination of publishers' data. Therefore, one could reflect on the possibility of regulatory intervention to remedy this asymmetry in bargaining power. Public authorities can consider data separation or data silos in order to limit Google's ability to combine publishers' data for ad arbitrage. As a single publisher may not have enough scale and scope of data for ad targeting, policy makers can consider encouraging a collective action of publishers to form a coalition which pools their data for targeting but prohibits Google and other intermediaries from combining their data with other data in order to limit data leakage. Note that limiting data leakage should help better preserve consumer privacy than letting data leakage happen.

Although publishers and advertisers share a common interest in creating a level-playing field to make ad intermediation more competitive, they may have conflicting interests regarding data combination: advertisers may like maximal data combination as this facilitates ad targeting and lowers advertising prices by expanding supply of ad inventory for targeting. However, combining all available data to build super profiles of consumers may reduce publishers' incentive to invest in content.[18] It is desirable to conduct research on optimal scope of data combination by ad intermediaries.

Public authorities can also introduce measures regarding Google's leverage of data and inventory: they may consider mandatory data sharing and data silos and force Google to make YouTube inventory available on rival DSPs.

In order to eliminate Google's conflicts of interest in ad intermediation, one could also draw inspiration from the regulation of electronic financial trading market (Srinivasan, 2020) and reflect on the need for guidelines and oversight against conflicts of interest. As a last resort, if all such steps failed, more structural measures ranging from operational separation to full ownership separation could be considered.

To make the open display advertising market more transparent, public authorities can consider encouraging greater provision of transaction data together with introduction of common transaction ID and enabling independent verification within walled gardens.

Regarding the AMP standard, measures could be envisaged to ensure that, instead of imposing the standard, Google treats in a non-discriminatory way, in its search results, all articles that meet an objective and neutral performance criterion of loading speed. It should also be considered whether restrictions should be put in place regarding the collection and/or use of browsing data due to the caching of AMP articles.

As a final word, it needs to be emphasized that online advertising has come to represent a core element of complex ecosystems, in which any change can have far-reaching societal

[18] Even from a static point of view, maximizing data combination may harm consumers as this facilitates platforms' manipulations of consumer behavior by taking advantage of vulnerabilities in consumer psychology (Calo, 2014)

consequences beyond what is intended when the change is put in place. Therefore, without prejudice to the limitations of the restricted scope of this case study, public oversight and interventions in platforms' advertising practices could appear justified based on all the issues identified in this report. Given, however, the constantly evolving features and functioning of the ecosystems involved, the design and calibration of any public measure which would be considered should be done with utmost care.

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