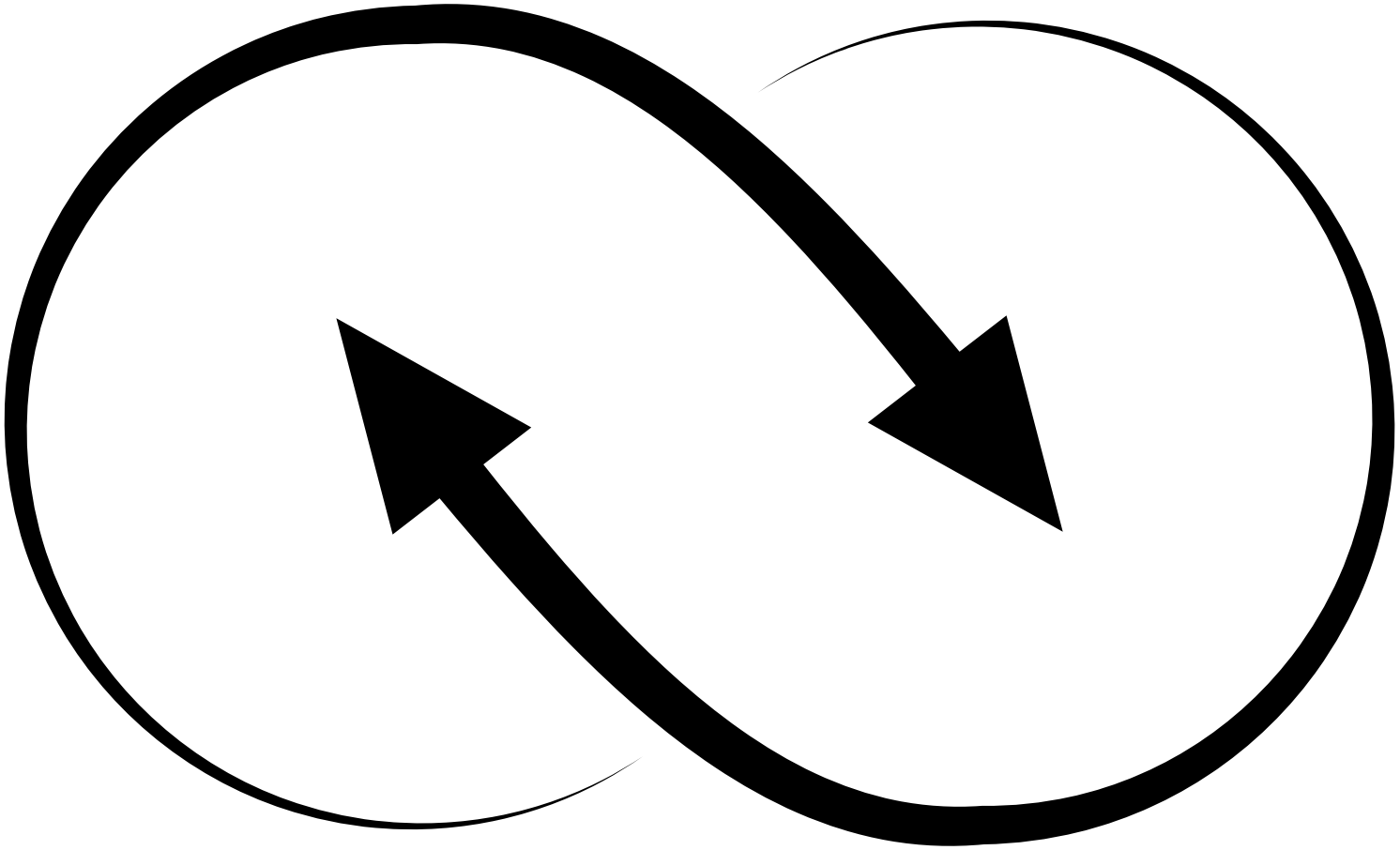
THE OPEN DISPLAY ADVERTISING ECOSYSTEM: COMPETITION CONCERNS AND POLICY INTERVENTIONS



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CPI ANTITRUST CHRONICLE JUNE 2023

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THE OPEN DISPLAY ADVERTISING ECOSYSTEM: COMPETITION CONCERNS AND POLICY INTERVENTIONS

By Alexander Witte & Jan Krämer

This paper investigates Google's potentially anticompetitive practices, such as self-preferencing, discrimination against rivals, and leveraging its dominance in the ad tech industry, which, as we argue, have led to barriers to entry, distorted competition, and negatively impacted other stakeholders in the ad tech value chain. To foster a more equitable and competitive landscape, we discuss policy interventions that combine structural separation of Google's ad server function from its remaining ad tech services and ensuring non-discriminatory access to essential inputs on the demand-side, like unbundling exclusive access to first-party inventory from Google's demand-side platform ("DSP") services. These measures aim to mitigate market power, preserve efficiency gains from vertical integration, and benefit publishers and advertisers. Increased competitive pressure for ad exchanges and DSPs will likely spur innovation and decrease price levels. Implementing these policy interventions requires regulators and policymakers to carefully balance the benefits of promoting competition with the potential costs of disrupting efficiency gains and technical synergies offered by Google's integrated services, ultimately aiming for a more transparent, competitive, and innovative ad tech landscape that serves the best interests of all stakeholders.

I. INTRODUCTION

Online advertising has transformed the way businesses promote products and services, allowing for precise targeting and real time optimization. The open display advertising ecosystem, which involves the buying and selling of ad inventory on websites and mobile apps, is a critical component of this landscape. Most online content providers, henceforth publishers, do not have the resources to run their own infrastructure to facilitate display ad transactions – unlike large platforms such as Facebook.[2] Instead, these publishers, ranging from major news companies to small blog owners, rely on a complex supply chain – the so-called "ad tech stack" – to sell ad placements to advertisers and use the revenue to sustain the provision of content to consumers.

The ad tech industry has recently attracted regulatory attention due to concerns over market concentration, particularly with Google's dominance.[3] This concentration poses risks not only to stakeholders in the ecosystem, but to society at large. High prices for ad intermediation can lead to higher retail prices, or more limited access to free, high-quality content.[4] Lack of competition may also delay or foreclose efficiency-enhancing innovation.

In response to these concerns and following its own assessment, the United States Department of Justice ("DOJ") filed a complaint against Google for monopolizing the ad tech industry in January 2023,[5] citing self-preferencing behavior to foreclose rivals and conflicts of interest arising from vertical integration. Google owns the largest ad exchange platform ("AdX"), for which it provides the largest access tools to both advertisers and publishers, while also directly competing with publishers for advertiser demand.[6] Similarly, the French Competition Authority ("FCA") has handed out a €220 million fine to Google for favoring its own services in ad tech in France.[7]

To foster competition and innovation in the ad tech ecosystem, new regulatory policies have been introduced or proposed, such as the *Digital Markets Act* ("DMA"), which entered into force in November 2022, and the proposed *Advertising Middlemen Endangering Rigorous Internet Competition Accountability Act* ("AMERICA Act"). These policies focus on prevention of anticompetitive practices and eliminating conflicts of interest among large tech platforms, the latter exclusively in ad intermediation.[8]

This paper aims to examine the (anti-)competitive environment in ad tech and to discuss possible impact of potential policy interventions. The paper is structured as follows: Section II reviews the ad tech ecosystem, provides background on its key players and their interactions,

2 Social media platforms typically sell their inventory through proprietary self-service interfaces to advertisers. For instance, advertisers can use the *Ads Manager* to launch ad campaigns exclusively on Meta's platforms, such as Facebook, Messenger, or Instagram. See Facebook Business, *Ads Manager*, FACEBOOK, https://www.facebook.com/business/tools/ads-manager (last visited May 10, 2023).

3 For instance, in 2020 and 2021 respectively the United Kingdom Competition and Markets Authority ("CMA") and the Australian Competition and Consumer Commission ("ACCC") launched studies to examine the state of competition in online advertising at large, the latter focusing exclusively on ad tech. See Competition & Mkts. Auth., *Online Platforms and Digital Advertising Market Study* (2020), https://www.gov.uk/cma-cases/online-platforms-and-digital-advertising-market-study (last visited May 10, 2023); Austl. Competition & Consumer Comm'n, *Digital Advertising Services Inquiry* 2020-21 (2021), https://www.accc.gov.au/inquiries-and-consultations/finalised-inquiries/digital-advertising-services-inquiry-2020-21 (last visited May 10, 2023).

4 Brands likely pass on marketing expenses to consumers in form of higher retail prices. Many publishers rely on advertising revenue to sustain provision of content to consumers at zero cost.

5 DOJ Complaint (2023), *United States v. Google LLC*, No. (not yet assigned) (N.D. Cal. 2023).
In Europe, the French Competition Authority ("FCA") "Autorité de la Concurrence" made a similar, albeit less extensive litigation in 2021, while European Commission has announced a yet to be concluded antitrust investigation of Google's conduct in ad tech in the same year. See FCA (2021), Autorité de la concurrence, Decision No. 21-D-11, *Regarding Practices Implemented in the Online Advertising Sector* (2021), https://www.autoritedelaconcurrence.fr/en/decision/regarding-practices-implemented-online-advertising-sector. Press Release, European Commission, *Antitrust: Commission Opens Investigation into Possible Anticompetitive Conduct by Google in the Online Advertising Technology Sector* (June 22, 2021), https://ec.europa.eu/commission/presscorner/detail/en/ip_21_3143 (last visited May 10, 2023).

6 As revealed by the DOJ Complaint (2023), one of Google's own executives posed that "[t]he analogy would be if Goldman or Citibank owned the NYSE." Compl. *Supra* note 5 at 3, ¶ 6.

7 Press Release, Autorité de la concurrence, *The Autorité de la concurrence Hands Out a €220 Millions Fine to Google for Favouring Its Own Services in the Online Advertising Sector* (June 7, 2021), https://www.autoritedelaconcurrence.fr/en/communiques-de-presse/autorite-de-la-concurrence-hands-out-eu220-millions-fine-google-favouring-its (last visited May 10, 2023).

8 The DMA defines obligations for digital gatekeepers that seek to prevent anticompetitive practices. Gatekeepers in the sense of the DMA are "digital platforms that provide an important gateway between business users and consumers, […] thus creating a bottleneck in the digital economy." Press Release, European Commission, *Digital Markets Act: Rules for Digital Gatekeepers to Ensure Open Markets Enter into Force*, ¶ 2 (Oct. 31, 2022), https://ec.europa.eu/commission/presscorner/detail/en/ip_22_6423 (last visited May 11, 2023). The AMERICA Act is a bill proposed by eleven U.S. Senators in March 2023 that seeks to restore competition in digital advertising by eliminating conflicts of interest of major (processing >$5 billion in ad transactions) advertising platforms, mainly through separational remedies (divestiture for companies processing >$20 billion in ad transactions) and transparency obligations. *The AMERICA Act: Lee Introduces Bill to Protect Digital Advertising Competition*, March 30, 2023, U.S. SENATOR MIKE LEE, https://www.lee.senate.gov/2023/3/the-america-act (last visited May 11, 2023).

and examines the current state of competition. Section III showcases the potentially anticompetitive practices of Google, particularly leveraging and self-preferencing, that may have contributed to its dominance over rivals. In Section IV we discuss possible policy interventions such as access and separation remedies. Finally, Section V concludes.

II. BACKGROUND ON THE ONLINE ADVERTISING SUPPLY CHAIN

A. How Display Advertising Inventory is Sold Through the Ad Tech Ecosystem

The ad tech ecosystem comprises a supply chain of computerized intermediaries that automate the transaction process between advertisers and publishers in real-time, either directly or through programmatic "on-the-spot" auctions using the Real-time Bidding ("RTB) protocol. Programmatic advertising enables publishers and advertisers to optimize transactions using real-time information about users and ad placements to maximize ad revenue or returns on advertising campaigns.

The ad tech ecosystem is complex and involves a plethora of different actors that interact with each other at different layers of the supply chain. At some level of abstraction, the process involves the following steps.[9]

1. When a user visits a webpage (or mobile app),[10] the browser requests ads from the publisher ad server while loading the site's first-party content.
2. The publisher ad server, a central management and reporting hub, decides which ad to serve for each ad slot. It typically prioritizes offering ad inventory to specific advertisers with whom a publisher has closed direct deal contracts. After serving these contracts, the ad server instructs the browser to call ad exchanges for unsold inventory.[11]
3. Ad exchanges, or supply-side platforms ("SSPs"), carry out real-time ad auctions. They enrich ad opportunities with user information and send bid requests to demand-side platforms ("DSPs").[12]
4. DSPs automate ad purchase decisions across multiple ad exchanges. Upon receiving a bid request, a DSP evaluates the ad opportunity based on campaign parameters and calculates an appropriate bid on behalf of its advertising customers.[13]
5. The exchange hosts an auction among all bids received and selects the winner. Each exchange forwards its local auction's clearing price, net of its fees, to the publisher ad server.[14]
6. The publisher ad server selects a winner among all bids received according to yield optimization rules and returns its decision to the user's browser.
7. The browser requests the ad content from the advertiser's ad server, which serves the winner's ad content along with advertiser tracking code on the website.[15]
8. The publisher receives the winning advertiser's bid net of the fees charged by the various intermediaries involved in the transaction.

DSPs and ad exchanges typically charge their respective customers a percentage commission deducted off the gross bid received before submitting it to the subsequent auction stage. Ad servers charge a flat volume-based fee.[16]

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9 We chose to refrain from outlining the technical details of the programmatic transaction process within the scope of this article. Also note that there exist a multitude of variations to open display transactions, such as private marketplaces, automated guaranteed deals, programmatic direct deals, etc. A detailed explanation of the peculiarities of each is beyond the scope of this article.

10 For the purpose of this paper, we will not delineate between transaction and ad serving process for web and mobile environment.

11 See Maciej Zawadziński, *What is an Ad Server and How Does It Work?*, CLEARCODE (2018), https://clearcode.cc/blog/what-is-an-ad-server (last visited May 11, 2023).

12 Note that, similar to market studies of public authorities in open display advertising, see ACCC (2021); CMA (2020), *supra* note 3, we include ad networks in our definition of DSPs. The reason is that modern ad networks usually do no longer operate distinctively to DSPs.

13 DSPs typically coordinate on a single bid among their customers to avoid self-competition in the auction hosted by the exchange. See Amine Allouah & Omar Besbes, *Auctions in the Online Display Advertising Chain: A Case for Independent Campaign Management*, 17-60 Colum. Bus. Sch. Research Paper (2017).

14 Historically, exchanges would perform second-price auctions. Nowadays, most exchanges have transitioned to a first-price auction model. See CMA (2020), *Appendix M, infra* note 22, at 11, ¶ 38.

15 Advertisers use ad servers for similarly to publishers as a management hub of their campaigns, managing creatives, tracking, and reporting. See Zawadziński (2018), *supra* note 11.

16 DOJ Complaint (2023), *supra* note 5, at 22, ¶ 57.

B. Market Concentration

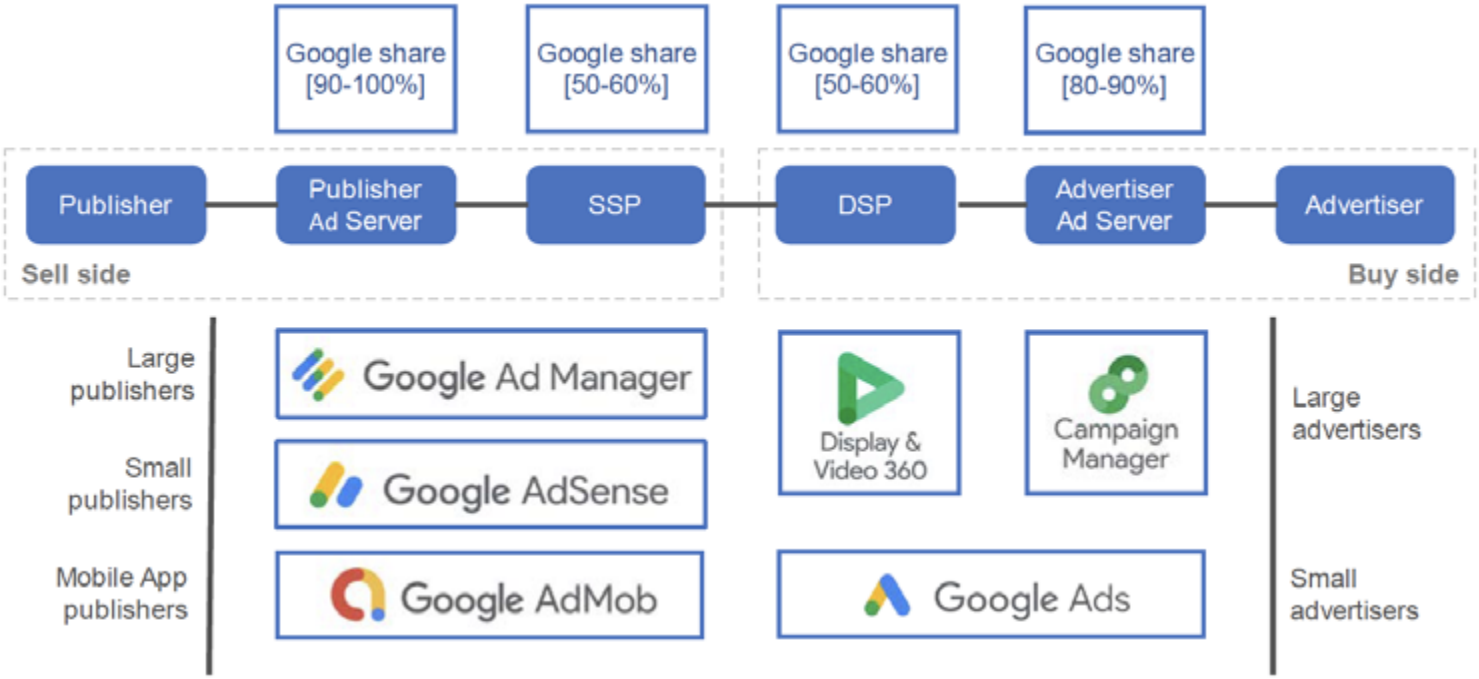

Figure 1: *Illustration of Google's products and estimates of its market share in ad tech in the United Kingdom as of 2019. Ad server market shares are in terms of volume of impressions. SSP and DSP market shares are in terms of value of impressions. Source: CMA (2020).*

Various reports on competition in ad tech over different geographical regions have found Google to be the largest player at every step of the ad intermediation value chain.[17] Figure 1 illustrates the CMA's estimates of Google's market share in the United Kingdom in 2019.[18] The publisher ad server market is particularly concentrated, with more than 9 out of 10 impressions being served by Google's product *Google Ad Manager* ("GAM"), formerly *DoubleClick for Publishers* ("DFP").[19] In the ad exchange market, 50-60 percent of the value of ads flows through Google's product *AdX*, since 2019 bundled with DFP as GAM.[20] Similarly, estimates for combined market share of Google's DSP products *Google Ads*, formerly *AdWords*, and *Display & Video 360* ("DV360"), formerly *DoubleClick Bid Manager*, is 50-60 percent of the value of impressions. Google's advertiser ad server product *Campaign Manager* serves 80-90 percent of impressions.

Google's extent of vertical integration, built through a series of acquisitions,[21] incentivizes leveraging market power from dominated markets into adjacent layers of the value chain. Such market power is rooted in self-reinforcing power of cross-side network effects, which Google leverages through its vertically integrated product suite thereby potentially foreclosing competition by smaller rivals.

17 ACCC (2021), *supra* note 3, at 54; CMA (2020), *supra* note 3, at 266, ¶ 5.213; DOJ complaint (2023), *supra* note 5, at 3, ¶ 6; FCA (2021), *supra* note 5, 72-73.

18 Estimates in other geographical regions are qualitatively similar. See ACCC (2021), *supra* note 3, at 54.

19 In 2019, Google rebranded most of the products in its ad tech suite. However, DFP and *AdX*, now both bundled as the GAM product, are commonly still addressed by their former names to delineate the different roles of ad server and ad exchange. We hereinafter follow suit.

20 The CMA (2020), *supra* note 3, at 266, n.387, includes Google's ad networks for mobile ad serving, *AdMob*, and web ad serving, *AdSense*, in its definition of SSPs. Modern ad network products for publishers are distinct from ad exchanges like *AdX* in that they generally serve smaller publishers, who do not meet the required impression volume to connect to *AdX*. Instead, they offer simple plug-&-play solutions, albeit at higher cost and less control. *AdSense* for instance, does not serve ads from third-party demand sources, only from Google's DSPs. Moreover, estimates suggest *AdSense* charges 32 percent revenue share homogeneously across all publishers compared to *AdX* average 20 percent take rate. Google, *AdSense revenue share - AdSense Help*, GOOGLE SUPPORT, https://support.google.com/adsense/answer/180195?hl=en&ref_topic=1319755&sjid=9467060323509428 38-EU (last visited May 10, 2023) (stating *AdSense*'s revenue share); DOJ Complaint (2023), *supra* note 5, at 53, ¶ 122 (stating *AdX*'s revenue share).

21 In 2007 Google acquired *DoubleClick*, the leading publisher ad server by the time and with plans to launch an ad exchange *DoubleClick Ad Exchange* or *AdX*. In 2009 Google acquired *AdMob*, its current network to serve ads on mobile apps. In 2010 it acquired Invite Media, which formed the basis for its DSP product DV360. One year later in 2011, Google acquired *AdMeld* and integrated its technology for yield optimization into its ad exchange *AdX*. See ACCC (2021), *supra* note 3, at 76; CMA (2020), *supra* note 3, at 272; DOJ Complaint (2023), *supra* note 5, 31-36, ¶ 76 – 89.

III. ANTICOMPETITIVE PRACTICES

A. Leveraging Practices to Launch Network Effects and Gain Market Power

1. Leveraging Market Power from Consumer-facing Services into the DSP Market

Google exploits its market power as a search engine and video streaming publisher (e.g. *YouTube*) to influence the DSP market. Advertisers, especially smaller ones, typically only use a single DSP to purchase ad inventory.[22] Moreover, advertisers value access to the large user base and unique advertising formats, such as search and in-stream videos, on Google's consumer-facing services.[23] Thus, by exclusively tying access to Google *Search* and *YouTube* to its DSP services, advertisers have strong incentives to adopt Google's DSPs over services offered by competitors. If an advertiser wants to include Google's first-party inventory with third-party inventory of other publishers in the same advertising campaign, it *must* launch that campaign through Google's DSPs.

2. Leveraging Market Power from the DSP to the Ad Exchange Market

By virtue of cross-side network effects between publishers and advertisers, Google's large advertiser base using its DSP products makes access to them attractive for publishers.[24] Publishers access DSP demand by offering inventory on exchanges, often adopting multiple exchanges (multi-homing) to maximize demand per impression. DSPs also multi-home, integrating and bidding across multiple exchanges for efficient access to publisher inventory. While single-homing on both market sides leads to a "winner-takes-all" dynamic in two-sided markets, i.e. users on both sides flock to whichever platform offers them access to the largest share of a complementary user group, launching a virtuous feedback loop in favor of a single platform, multi-homing enables platforms to grant access to shared users, mitigating the network effects' competitive implications.

An effective strategy to counteract multi-homing's pro-competitive effects is exclusive dealing, which leads to a "competitive bottleneck" whereby a platform that acts as the bottleneck for its set of single-homing users on one side of the market, gains market power over multi-homing users on the other market side.[25] Thus, if one exchange would be able to offer exclusive access to a particular set of DSPs, and publishers sufficiently value access to that set, that exchange will gain market power over publishers despite the presence of multi-homing.

Google creates such a bottleneck by tying its DSP services to its ad exchange, thereby gaining market power over publishers. For publishers to access Google's significant advertiser base, they must adopt Google's exchange, *AdX*. Google achieves this through preferentially routing bids from Google's DSPs to *AdX*.[26] Note that such exclusive routing of bids goes against advertisers' interest, who would prefer a larger variety of supply, but face high switching costs due to Google's market power in the DSP market.

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22 There are strong incentives for advertisers to use a single DSP within any single campaign. First, DSPs operate on different user IDs. Therefore, advertisers that use multiple DSPs for a particular campaign would not be able to apply frequency capping, i.e. limiting the amount of ad exposures on a particular user, and would face additional costs for reconciling performance reports and metrics on the user-level. Moreover, there could be scenarios in which the same advertiser, by using multiple DSPs for the same campaign, competes against itself in auctions and thereby drives up costs. Competition & Mkts. Auth., *Online Platforms and Digital Advertising Market Study. Appendix M: intermediation in open display advertising* ¶ 189 (2020), https://www.gov.uk/cma-cases/online-platforms-and-digital-advertising-market-study (last visited May 10, 2023); Moreover, DSPs other than *Google Ads* usually cater towards larger advertisers or media agencies due to specialized and complex functionalities for e.g. custom targeting, and relatively high minimum spend requirements. Meeting such spend requirements or thresholds for volume-based discounts further incentivizes ad buyers to use only a single DSP.

23 While the importance for advertisers to access to Google *Search* is arguably undisputed, the market power of *YouTube* over advertisers may be less obvious. The CMA (2020) finds that video advertising is the largest display advertising format (around 40 percent) in the United Kingdom with *YouTube* being the largest video publisher. The CMA (2020) estimates that *YouTube* reaches 90 percent of all users in the United Kingdom every month across all age segments, and that users spend about twice as much time on *YouTube* compared to *Facebook*. See Competition & Mkts. Auth., *Online Platforms and Digital Advertising Market Study. Appendix ZA: assessment of potential pro-competition interventions to address market power in open display advertising*, at 33, ¶ 149 (2020), https://www.gov.uk/cma-cases/online-platforms-and-digital-advertising-market-study (last visited May 10, 2023).

24 Cross-side network effects between publishers and advertisers significantly impact competition between ad tech platforms. Publishers benefit from more advertisers bidding on their inventory, while advertisers gain from a larger publisher base, increasing their audience reach. Thus, an ad tech provider becomes more attractive with a higher customer base on each market side, everything else being equal.

25 See Mark Armstrong, *Competition in Two-Sided Markets*, 37 RAND J. ECON. 668 (2006); Mark Armstrong & Julian Wright, *Two-Sided Markets, Competitive Bottlenecks and Exclusive Contracts*, 32 ECON. THEORY 353, (2007).

26 To provide some order of magnitude, the FCA (2021), *supra* note 5, at 52. ¶ 227, shows in its complaint, that in 2019, 60-80 percent of impressions offered on Google's ad exchange, the largest ad exchange in the market, is bought by either Google Ads or DV360. One publisher stated that demand from *AdX* yields 40 to 90 percent of its programmatic revenues. *Id.* at 54, ¶ 231.

3. Leveraging Market Power from the Ad Exchange to the Publisher Ad Server Market

Google's ad exchange's large share and value of bids make it attractive for publishers, who typically use a single ad server to connect with multiple exchanges, i.e. multi-home.[27] However, discrimination between ad server providers by an exchange with market power can steer publishers toward a specific provider by creating a bottleneck. Google establishes discriminatory access by limiting interoperability between its exchange and third-party ad servers, granting only its own ad server DFP real-time access to its demand. Publishers' choice of using *Google Ad Manager* (formerly DFP) is primarily driven by this unique ability to provide efficient access to *AdX*. Because publishers employing third-party ad servers face opportunity costs from not accessing *AdX*'s demand in real-time, this strategic denial of interoperability forecloses competition in the publisher ad server market.[28]

While leveraging practices impact advertisers' and publishers' choice of service providers, adoption alone isn't sufficient for ad tech platforms to be profitable. They compete on two layers: adoption and winning impressions, with commissions earned from forwarding winning bids.[29] This commission-based model incentivizes providers with market power in the publisher ad server market to discriminate against independent demand sources when executing its "final say" to decide which ad to serve.

B. Self-preferencing of Integrated Demand Sources to Win More Auctions

Google has used its market-leading publisher ad server to discriminate against rival bidders through various practices for over a decade. However, self-preferencing manifestations have changed due to market conditions and rivals' innovations countering Google's advantageous conditions.

Non-Google exchanges generally have three options to buy from Google's publisher ad server DFP: integrating through the waterfall setup, *Header Bidding* auction, or *Open Bidding* auction. All these options are inferior to the way *AdX* buys from DFP.

1. The First Look Advantage over Waterfall Bidders

Third-party exchanges using the Waterfall setup are contacted sequentially, based on decreasing average historic yield. Google's ad server does not allow non-Google exchanges to bid on every impression in real-time. Conversely, Google's own exchange benefits from a feature called *Dynamic Allocation*, contacting it for every impression before waterfall-integrated exchanges, using the highest priority waterfall exchange's static bid as a price floor. This process prevents exchanges with potentially higher bids from competing, depriving rivals and publishers of revenue.

2. The Last Look Advantage over Header Bidders

Dissatisfied with the waterfall setup and the inherent "first look" advantage of Google's exchange the industry developed *Header Bidding*: Publishers use the client's browser to insert third-party exchange bids into Google's ad server before calling its own exchange through *Dynamic Allocation*. The "first look" advantage transformed into a "last look" advantage. *Header Bidding* increased competitive pressure on Google's exchange by allowing rivals to submit real-time bids, raising the "price-to-beat." However, Google's exchange still enjoyed a competitive advantage by operating a second-price auction, buying impressions at an increment over the runner-up bid from a rival exchange, if only a single buyer on Google's exchange would bid higher. *Header Bidding* significantly improved publisher revenue,[30] but direct competition with Google's exchange bids could have yielded more. Estimating actual revenue foregone due to the last look is challenging due to the lack of a counterfactual scenario and changes to bidders' strategies in that case.[31] Nevertheless, the FCA estimates that in the absence of the last look, rival exchanges would have won a significantly larger number of auctions.[32]

27 Using a single ad server is efficient for publishers as it serves as the central management hub to streamline operations and reporting across possibly multiple webpages and mobile apps. CMA (2020), *Appendix M, supra* note 22, at 65, ¶ 264; FCA (2021), *supra* note 5, at 74, ¶ 330.

28 For magnitude of opportunity costs, see *supra* note 26. For discussion of reasons of why the majority of publishers chooses to adopt GAM as their ad server, see CMA (2020), *Appendix M, supra* note 22, at 112, ¶ 445.

29 DOJ Complaint (2023), *supra* note 5, at 29, ¶ 73.

30 Publishers that adopted *Header Bidding* report revenue gains of 30 percent or even up to 50 percent. See Ricardo Bilton, *With Header Bidding, Publishers are Boosting CPMs by as Much as 50 Percent*, DIGIDAY (November 12, 2015), https://digiday.com/media/header-bidding-publishers-boosting-cpms-much-50-percent/ (last visited May 10, 2023).

31 For instance, in absence of the right of last look, Google's exchange may have changed to a first-price auction model, in which the highest bidder pays its bid, to submit a higher bid in the subsequent competition with rival exchanges. However, in first-price auctions, it is optimal for a bidder to bid lower than its true valuation to be able to realize a buyer surplus (see for instance, Paul Klemperer, *Auction Theory: A Guide to the Literature*, 13 J. ECON. SURVEYS 227 (1999)). Thus, in case Google's exchange had hosted a first-price auction, it may have been that bidders had bid lower. The harm inflicted on publishers therefore depends on the extent to which the resulting clearing prices of auctions in such a hypothetical scenario would actually exceed the clearing price of auction instances where Google's exchange won the impression at an increment of the highest bidding rival by virtue of the right of last look. See FCA (2021), *supra* note 5, 41 – 43, ¶ 170 – 181.

32 FCA (2021), *supra* note 5, at 42, ¶ 177.

3. The Interaction Between Last Look and Dynamic Revenue Share

Google further increased its win rates over rival exchanges by dynamically adjusting its revenue share to win more impressions.[33] Exchanges forward bids to publisher ad servers net of their revenue share, so the exchange with the lower revenue share wins the auction, all else being equal. The right to a "last look" uniquely enables Google's exchange to precisely determine the revenue share needed to win an auction. Publishers still receive the contractually agreed-upon revenue share on average, as Google demands a higher share during low competition and subsidizes instances where it lowers its share to beat rivals. This strategy effectively forecloses rival exchanges from winning impressions, even in cases where they could have outperformed Google's exchange despite the "last look" advantage.

4. Open Bidding and the Advantageous Conditions for AdX

Google launched its own version of *Header Bidding called Open Bidding* (formerly *Exchange Bidding*). *Open Bidding* is a "server-side" version of *Header Bidding*, granting publishers the ability to offer inventory to exchanges in *Open Bidding through Dynamic Allocation*, giving them the "right of last look" too. This feature, alongside other benefits like reduced latency by not using the client's browser but Google's server to host the auction, incentivizes publishers to adopt *Open Bidding*, potentially even over independent *Header Bidding* implementations. However, despite the advantages it offers, Google discriminates against rivals in *Open Bidding* to increase its expected probability of winning.

First, Google charges rival exchanges an additional 5-10 percent commission to further reduce their net bids by raising their costs. Second, *Open Bidding* disallows vertically integrated rival exchanges from forwarding bids from their DSPs, depriving them of technical efficiency gains like deterministic user identification and latency advantages between vertically integrated DSPs and exchanges.[34] This impacts their competitiveness in the auction, reducing average bid amounts and increasing the probability of exclusion due to auction timeout thresholds.[35]

5. Project Poirot – How Google's Display & Video 360 discriminates against Rival Exchanges

Google allegedly reduces the bids submitted by its DSP DV360 into rival exchanges by 10-90 percent, weakening their competitiveness against its own ad exchange in the final auction.[36] Google officially states that this practice is due to an increasing number of exchanges running first-price auctions to increase the clearing prices of their local auctions and thereby increase competitiveness at the subsequent ad server level. To protect its buyers from overpaying in such first-price auctions DV360 shades bids, which would indeed be in advertisers' best interest. However, the DOJ, citing internal documents, claims that this practice, at Google internally dubbed "Project Poirot," intentionally aims to reduce the competitiveness of rival exchanges and route more bids through Google's own exchange.[37]

33 DOJ Complaint (2023), *supra* note 5, 86-90, ¶ 198-207.

34 User identification in web-based environments usually happens via user IDs stored in cookies, i.e. small text files stored on the user's device. Whenever the browser contacts a domain, e.g. that of an exchange to sell ads, the domain can read the cookie to identify the user. However, DSPs typically connect to exchange through a server-side connection, i.e. they do not have access to their user IDs stored on the client when receiving a bid request. Instead, DSPs receive the user ID of the exchange as part of the bid request and must match the user ID of the exchange with their own, to reidentify the user and evaluate the ad opportunity. Because this process, called cookie syncing, is error prone, user identification is stochastic. Cookie match rates vary between ad tech providers. As a rule of thumb, being able to identify the user in less than 40 percent of cases is considered "poor matching," whereas anything above 60 percent is already considered "decent matching." See Maciej Zawadziński, *What is Cookie Syncing and How Does it Work?*, CLEARCODE (June 7, 2022) https://clearcode.cc/blog/cookie-syncing/ (last visited May 11, 2023). Failed cookie syncing means that the user can't be identified and ads can't be targeted according to user characteristics, hence reducing advertisers' bids. However, a vertically integrated DSP would not need to sync their cookies as it operates on the same domain as the exchange and therefore shares the same user IDs. Thus, everything else being equal, an integrated DSP would be expected to submit higher bids and therefore have a higher expected winning probability than rivals on its own vertically integrated exchange.

35 Publishers implement such timeouts to avoid adverse effects on load time of ad content, which could decrease user experience or even revenue, if the ad has not been visibly displayed.

36 DOJ Complaint (2023), *supra* note 5, 90-101, ¶ 208-230.

37 To illustrate the advantage given by DV360 to *AdX* under Project Poirot, consider the following example: DV360 has a bidder with $1CPM valuation for a specific impression. It bids into one rival exchange which demands a 10 percent revenue share and holds a first-price auction. The clearing price is $0.90 which is, by virtue of "last look," also the price to beat for Google's exchange. Google's exchange in this case, however, could not beat this price since itself demands a 20 percent revenue share (assuming it doesn't adjust it dynamically), i.e. only has a net bid of $0.80 coming from DV360. However, by bidding e.g. 50 percent lower into the rival exchange, the price-to-beat for *AdX* becomes $0.45. *AdX* wins, the auction clears at $0.46 paid to the publisher and the *AdX* charges DV360 20 percent more, i.e. $0.55 for the impression. By reducing the amount bid into rival exchanges, *AdX* can maintain its high revenue share without risking losing impressions to rival exchanges. To provide an order of magnitude, through Project Poirot, rival exchanges allegedly experienced 22 to 42 percent decline in advertiser spend coming from DV360. Given the large share of advertiser demand represented by DV360 this allegedly lowered their win rates by 10 percent. *Supra* note 5, at 100, ¶ 228.

6. Unilaterally Deployed Changes to Auction Rules to Further Discriminate Against Rivals

Since September 2019, Google has been running a first-price unified auction ("FPUA").[38] Here, "unified" means that Google's exchange does no longer run a separate auction. Instead, buyers formerly bidding into the second-price auction hosted by Google's exchange, called *Authorized Buyers*, now directly bid into a first-price auction hosted by Google's ad server, along with exchanges bidding through *Open Bidding*, called *Yield Partners*, and the winning exchange from the *Header Bidding* auction. Industry commentators state that by transitioning from a first-price auction to a second-price auction, Google has ceded its advantage from having the "last look." The advantage does however not originate from the second-price auction mechanism, but rather from the advantage of observing the price to beat *ex ante*, i.e. before deciding on the bid.[39] In fact, for first-price auctions, economic theory would predict that the incentive to observe the price to beat is even larger. By knowing the other bidders' bids, buyer surplus can be maximized, and winner regret can be minimized (i.e. the opportunity cost equal to the difference between the price the winner has paid, and the price that would have been sufficient to beat the next highest bidder), by bidding just slightly higher than the next highest bid. While there is currently no data available to support the claim that Google retained its "last look" advantage, it has an even greater incentive to do so under a first-price auction when it is operating the auction platform and acting as a bidder on that platform. Such "unsealing" could happen either stochastically by algorithmic prediction of the clearing price based on historical data,[40] or – as was the case under "last look" – deterministically. The latter could be operationalized by Google if it simply observes rivals' bids and bids microseconds later. Publishers would not be able to notice such difference in timing of bid submissions as Google has changed its reporting of auction timestamps in the log files provided to publishers by rounding them from previously reported microsecond to the nearest hour.[41] While the retainment of the "last look" advantage is not verifiable without access to raw auction data, two other changes accompanying FPUA – *Minimum_bid_to_win* ("MBTW") feature and *Unified Pricing Rules* ("UPRs") – warrant scrutiny.

MBTW shares the price-to-beat post-auction with *Authorized Buyers* and *Yield Partners* but not *Header Bidding* exchanges. Sharing such information makes the auction more efficient in general by reducing the risk of overpaying for impressions and thereby incentivizing participation. However, sharing it selectively, disadvantages those without access, i.e. the exchanges participating in independent *Header Bidding*, and thus makes bidding on the latter relatively less attractive than bidding through alternative channels such as Google's exchange or Google's *Open Bidding*.[42] After claiming technical infeasibility of sharing MBTW with *Header Bidding* participants, Google agreed to share the information with all exchanges as part of binding commitments to the FCA in 2021.[43]

UPRs prevent publishers from setting buyer-specific reserve prices in FPUA. Public authorities concur that UPRs aim to increase win rates for Google's exchange and DSP services. Publishers would set differential price floors primarily to account for competitive advantages of buyers and thereby increase revenue.[44] A buyer holding a competitive advantage can be expected to have a wider distribution of maximum bids.[45] By applying a higher price floor to demand sources with such a competitive advantage, i.e. Google's DSPs or exchange,[46] the publisher can increase yield in instances of second-price auctions where the higher price floor reduces the extent of bid attenuation. However, such differential floors reduce the winning probability of the subjected demand source. By depriving publishers of the ability to set higher price floors to account for its competitive advantage, Google can increase its services' win rate, contrary to publishers' interest.

38 Jason Bigler, *An update on first price auctions for Google Ad Manager*, GOOGLE BLOG (2019), https://www.blog.google/products/admanager/update-first-price-auctions-google-ad-manager/ (last visited May 11, 2023).

39 Damien Geradin & Dimitrios Katsifis, *"Trust me, I'm fair": analysing Google's latest practices in ad tech from the perspective of EU competition law*, 16 EUROPEAN COMPETITION JOURNAL 11 (2020).

40 DOJ Complaint (2023), *supra* note 5, 113 – 116, ¶ 256 – 261 (noting that Google allegedly replaced last look by training a "rival bid" prediction algorithm called "Smart Bidding" based on the data over the distribution of bids collected over a whole decade – trillions of data points); CMA (2020), *Appendix M, supra* note 22, 125 – 126, ¶ 487 – 490. (Similarly stating that Google's superior access to auction data may provide the ability and incentive to algorithmically predict the "price-to-beat" in FPUA).

41 See Google Ads Manager Help, *Explore Data Transfer fields*, GOOGLE, https://support.google.com/admanager/table/7401123 (last visited May 11, 2023); Dina Srinivasan, Why Google dominates advertising markets, 24 STAN. TECH. L. REV. 55 (2020), at 135.

42 CMA (2020), *Appendix M, supra* note 22, at 124, ¶ 482.

43 Maria Gomri, *Some changes to our ad technology*, GOOGLE (June 7, 2021), https://blog.google/around-the-globe/google-europe/some-changes-our-ad-technology/ (last visited May 11, 2023).

44 Other reasons to set differential price floors may be steering of inventory to certain demand sources. For instance, publishers have an incentive to steer a certain number of impressions to an exchange, if that exchange offers a volume-based discount. DOJ Complaint (2023), *supra* note 5, at 102, ¶ 234.

45 Two mechanisms can lead to such a wider distribution of maximum bids. Either, the buyer, e.g. a DSP, represents a larger share of demand and thus makes the auction "thicker," or the buyers on the DSP have more information than others and adjust bids upwards accordingly. CMA (2020), *Appendix M, supra* note 22,, 119 – 120, ¶ 470.

46 Note that Google's DSPs tend to be the highest bidders on its vertically integrated exchange due to minimal cookie syncing losses (*supra* note 42,43), or allegedly due to the implementation of Project Poirot.

C. Impact on Competition

Google's extent of vertical integration has brought efficiency gains for publishers and advertisers, among other things, a unified end-to-end platform that offer data synergies and better user identification, or reduced latency which enhances user experience and may increase return on advertising investments.[47] Especially smaller advertisers benefit from efficient "one-stop-shop" solutions offered by Google's DSP *Google Ads*, that allows launching ad campaigns of various formats to a large proportion of Internet users at no explicit cost and without entry requirements.

However, its extent of vertical integration has also enabled and incentivized Google to leverage network effects and the resulting market power through tying its services, resulting in decreased adoption of rival services by advertisers and publishers. Simultaneously, Google diminishes pro-competitive effects of multi-homing by using its leading ad server to grant favorable conditions to its own services in most display ad auctions. Ad tech platforms, due to their commission-based business model, compete not only for adoption but also for winning auctions.[48] Self-preferencing in auctions lowers rivals' win rates, effectively depriving them of scale despite multi-homing.

Such anticompetitive practices in ad tech create barriers to entry and distort competition, harming stakeholders. These practices may have resulted in higher ad intermediation prices due to limited competition, negatively affecting publishers' revenues, advertisers' costs, and indirectly, consumers. Higher marketing costs may raise retail prices, while reduced ad revenue can compromise freely accessible online content.[49] Moreover, by foreclosing competition, Google may have been reducing choice and stifling innovation in the online advertising supply chain.[50] Lastly, the absence of competition enables Google to maintain opaque operations, such as blackbox auctions and unclear fees, without the risk of losing customers. This lack of transparency risks moral hazard and opportunistic behavior, potentially eroding trust in the ad tech ecosystem and harming all stakeholders.[51]

IV. DISCUSSION OF POLICY INTERVENTIONS

Considering the challenges and the resulting harm posed by Google's anticompetitive practices in the ad tech industry, it becomes evident that policy inventions are necessary to address these issues and foster a more equitable, competitive landscape. Google is the largest agent for buyers, provides the largest marketplace, acts on behalf of sellers, and competes with them at the same time. Such extensive vertical integration creates several conflicting incentivizes that promote leveraging practices and self-preferencing. First, a vertically integrated seller with market power (e.g. *YouTube*) has an incentive to discriminate against independent buy-side agents, i.e. DSPs, e.g. by refusing to deal/provision of access. Second, a vertically integrated buy-side agent with market power has an incentive to discriminate against marketplaces, e.g. by preferential and/or exclusive routing of bids. Third, a vertically integrated marketplace, i.e. ad exchange, with market power has an incentive to discriminate against independent sell-side agents, i.e. ad server, e.g. by refusing to deal/provide imperfect interoperability. Fourth, a vertically integrated sell-side agent with market power has an incentive to discriminate against independent marketplace and/or buy-side agents by providing advantageous transaction conditions for its own services (e.g. unsealing the auction, i.e. first look and/or last look, raising rivals' costs and depriving vertically integrated rivals from the resulting efficiency gains, i.e. *Open Bidding* rules, establish price parity clauses, i.e. UPRs, or selectively share valuable information, i.e. MBTW).

As Google is fully integrated along the entire ad tech value chain, behavioral remedies, such as transparency obligations or a ban of self-preferencing, are likely not sufficient and difficult to monitor and to enforce. In our view, addressing these conflicts requires policy interventions that focus on altering the underlying structure incentivizing such behavior while maximizing the difference between benefits and costs. We think that a combination of separating ad server functions and providing access to valuable inventory at the DSP level may yield the best outcome, preserving important efficiency gains between other vertically integrated layers of the value chain.

47 See e.g. *How Network Latency Affects the RTB Process for AdTech*, DATAPATH (Apr. 21, 2016), https://medium.com/@datapath_io/how-network-latency-affects-the-rtb-process-for-adtech-6ecbf29d025 (last visited May 12, 2023) (stating that high latency may lead to advertisers being charged for serving the impression without the user actually seeing the ad); Tejaswini Tilak, *NEED FOR SPEED: Why the Online Ad Industry Is Converging on Equinix*, EQUINIX (Nov. 18, 2013) https://blog.equinix.com/blog/2013/11/18/need-for-speed-why-the-online-ad-industry-is-converging-on-equinix/ (last visited May 12, 2023) (showing anecdotal evidence of how improved latency has increased bid rates on an exchange, which is ultimately benefiting publishers).

48 DOJ Complaint (2023), *supra* note 5, at 29, ¶ 73.

49 *Id.* 116 – 121, ¶ 262 – 273.

50 *Id.* at 121, ¶ 274, and at 122, ¶ 277.

51 *Id.* at 122, ¶ 276.

A. Structural Separation to Address Conflicts of Interests

Structural separation, though intrusive, addresses self-preferencing and coordinated behavior by breaking up Google's vertically integrated business. This one-off intervention requires no ongoing monitoring and can yield long-term benefits.[52] However, it is crucial to assess which services or functions should be separated to maximize effectiveness and minimize market impact.

Separating buy-side agent function promotes local competition among DSPs but may not extend beyond that. Google's DSPs would lose the exclusive access advantage, giving advertisers more choices. Competitive pressure at the DSP level would also discourage Google from preferentially routing bids to its exchange, reducing its market power over publishers. However, Google might still retain some ability to discriminate against independent exchanges for a large volume of auctions due to publishers' high switching costs in the ad server market.[53] Moreover, requiring separation between exchange and DSP would deprive advertisers and publishers from significant technical efficiency gains for advertisers and publishers when transacting over a vertically integrated exchange and DSP, e.g. minimal cookie syncing losses and reduced latency.[54] Separating the marketplace function, i.e. ad exchange, thus has similar considerations, depriving efficiency gains while leaving incentives for favoring integrated demand sources.

We think that separating the ad server from other ad tech services offers the most significant benefits while preserving technical efficiency gains. An independent ad server would have an incentive to act in the best interest of publishers, promoting multi-homing and non-discriminatory treatment of demand sources. Moreover, exchanges would have an incentive to become interoperable with any publisher ad server to maximize access to supply, increasing competitive pressure in the market and facilitate entry.

However, Google's DSPs might still preferentially route demand to its integrated exchange, preserving market power over publishers. To address this, separating the publisher ad server could be combined with addressing leveraging abilities on the demand side. If Google's DSPs lose market power over advertisers, preferential routing would prove detrimental. Advertisers could discipline Google by adopting rival services. One potential approach is to untie exclusive access to first-party inventory from Google's DSP services.

B. Access to Essential Inputs of Demand-side Services

Untying *YouTube* inventory from Google's DSP services could involve allowing third-party DSPs to sell *YouTube* inventory on non-discriminatory terms or disallowing Google from selling first- and third-party inventory through the same service.

Mandating access to *YouTube* inventory for third-party DSPs may involve significant costs that need to be outweighed by benefits to justify such a policy intervention. Google cites privacy protection and ad quality concerns as reasons to exclude third-party DSPs from selling *YouTube* inventory.[55] However, it remains unclear why Google, as a publisher, cannot blacklist malicious ads or obtain user consent for information sharing, as is common practice to comply with privacy law. Alternatively, disallowing sales of first-party and third-party inventory through the same service could create a level playing field for DSP providers but may result in efficiency losses for advertisers due to issues reporting and frequency capping when using multiple DSPs for the same campaign.[56] Moreover, such separation would also prevent smaller advertisers using *Google Ads* from benefits of a simple "one-stop-shop" solution to buy ad inventory that reaches the majority of Internet users. These costs must be weighed against potential benefits of increased competition.

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52 An alternative to structural separation may be operational separation, whereby functions such as ad serving, ad intermediation, and ad buying would be operationally independent, with separate management, staff, and decision-making processes, without changing the ownership structure. Such operational separations may be encountered for instance in financial industries, where, to prevent conflicts of interests, service providers are legally prohibited from acting on both sides of any particular transaction. However, given that Google represents the sell-side on more than 9 out of 10 transactions, Google would be de facto required to separate the ownership of the buy- from sell-side service to continue its operations. Thus, such functional separation would not be different from ownership separation. CMA (2020), *Appendix ZA, supra* note 23, at 18, ¶ 79. Moreover, according to Google, its services on the buy- and sell-side are already materially functionally separated. Thus, ongoing monitoring of adherence to regulatory obligations may prove costly for the regulator. *Id.* at 7, ¶ 9. Moreover, the unquestionable complexity of the ad tech industry may make monitoring virtually impracticable. This would ultimately make such less-intrusive remedies ineffective.

53 As industry blog comments on the switching costs in the publisher ad server market: "As a publisher, replacing your primary ad server is not a trivial task. Think of it like doing a mid-flight engine swap on an airplane. Except that it's your revenue engine. It's hard to imagine many publishers wanting to take such a risk." Ratko Vidakovic, *The Beginner's Guide to Header Bidding*, ADPROFS, https://adprofs.co/beginners-guide-toheader-bidding/ (last visited May 11, 2023). Moreover, see CMA (2020), *Appendix M, supra* note 22, at 65, ¶ 263 (discussing switching costs in the ad server market).

54 *Supra* notes 42 and 43.

55 CMA (2020), *Appendix M, supra* note 22, at 30, ¶ 136.

56 Advertisers would likely use a separate DSP by Google selling only its first-party inventory, in parallel with a DSP selling third-party inventory. In such a scenario, advertisers would face the inefficiencies of multi-homing across DSPs as discussed in *supra* note 22.

Unbundling first-party inventory from a DSP service might only promote local competition in the DSP market, with uncertain effects on the sell-side. Therefore, we think that structural separation of the ad server in combination with non-discriminatory access provisions to limit demand-side market power may effectively address Google's market power while preserving efficiency gains benefiting publishers and advertisers. The resulting competitive pressure could facilitate entry, spur innovation, and decrease price levels.

V. CONCLUSION

In this paper, we have highlighted the anticompetitive effects of Google's current and past practices in the ad tech industry, including self-preferencing, discrimination against rivals, and leveraging its dominance in various markets. These practices stem from Google's vertically integrated structure, creating barriers to entry, distorting competition, and negatively affecting rivals, publishers, advertisers, and consumers in the process.

To address these issues and foster a more equitable and competitive landscape, we propose policy interventions that combine structural separation of Google's ad server function from the remaining ad tech services and ensuring non-discriminatory access to essential inputs on the demand-side, such as untangling exclusive access to first-party inventory from Google's DSP services. While arguably being a strong policy intervention, we argue that this is required and proportionate to address the competitive issues in the ad tech value chain. Implementing these measures is expected to effectively mitigate market power, preserve efficiency gains from vertical integration, and benefit publishers and advertisers. Increased competitive pressure for exchanges and DSPs will likely spur innovation and decrease price levels.

Implementing these policy interventions requires regulators and policymakers to carefully balance the benefits of promoting competition with the potential costs of disrupting efficiency gains and technical synergies offered by Google's integrated services, ultimately aiming for a more transparent, competitive, and innovative ad tech landscape that serves the best interests of all stakeholders.

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