

Ex-post Assessment of Merger Control Decisions in Digital Markets

Final report

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Executive summary

PART I. GENERAL LESSONS FOR MERGER CONTROL IN DIGITAL MARKETS

1.1. INTRODUCTION AND METHODOLOGY FOR PART I

The Competition and Markets Authority (henceforth “CMA”) appointed Lear to carry out a study aimed at evaluating past merger decisions in the digital sector (“UK cases”) taken by the Office of Fair Trading (“OFT”) and the Competition Commission (jointly, the “Authorities”). The objective of the study is threefold:

- review merger cases undertaken by Competition Authorities (“CAs”) and the relevant economic literature to identify which Theories of Harm (“ToHs”) have been typically pursued by CAs in relation to these mergers, how such ToHs have been evaluated and which relevant economic features should be taken into account when evaluating mergers in the sector (research question 1);
- assess the UK cases and evaluate whether the decision that the Authorities have come to was reasonable based on the evidence that was, or would reasonably have been, available at the time (research question 2, or methodology assessment);
- evaluate market evolution following the mergers to ascertain whether the merger has led to a detrimental outcome (research question 3, or market outcome assessment).

Part I of the report addresses the first research question, drawing on a survey of economic literature, the analysis of past acquisitions undertaken by Amazon, Facebook and Google between 2008 and 2018¹ and on a review of past merger decisions taken by CAs.

1.2. SURVEY OF ECONOMIC LITERATURE

Certain features of digital markets create challenges for competition policy, starting with the prevalence of network effects. When the value that consumers derive from a product depends on the number of other consumers who use the same product, as is often the case in the digital sector, markets may have a tendency to take on a concentrated market structure. This implies that competition *for* the market, rather than *in* the market, is often the main mechanism to prevent incumbents of digital markets from exerting market power. In this context, the economic literature on innovation suggests that there may be an incentive for incumbents to carry out pre-emptive buyouts, that is buyouts of entrants with the goal of reducing potential future competition.

Further, a large number of digital products and services are offered free of charge to consumers and paid for with advertising dollars within so-called “markets for attention”. Attention is a scarce resource typically monetized through advertising. Advertisers are willing to pay more for “exclusive” eyeballs than for those that can be reached through multiple means. This means that platforms (i.e. content providers) not only care about the *size* of their audiences but also about their *composition*, and that CAs should carefully assess how a merger between platforms can affect both.

Finally, since the quintessential task of many digital platforms is that of making predictions of various sorts, data used to make those predictions (“big data”) is becoming increasingly relevant to shaping competition dynamics in digital markets. CAs and practitioners have voiced concerns that big data may be an insurmountable competitive advantage that incumbents naturally enjoy as a by-product of their

¹ Amazon, Facebook and Google were chosen for consistency with the analysis undertaken in Part II, where we assess mergers that involved these three companies (*Facebook/Instagram*, *Google/Waze* and *Amazon/The Book Depository*).

operations, further raising barriers to entry. Mergers may further enrich the data endowments – and thus the competitive advantage – enjoyed by incumbents of digital markets.

1.3. OVERVIEW OF TRANSACTIONS CARRIED OUT BY DIGITAL COMPANIES

Companies active in digital markets are remarkably active in mergers and acquisitions. We have analysed the publicly disclosed acquisitions carried out by Amazon, Facebook and Google between 2008 and 2018. Over this period, Google has acquired 168 companies, Facebook has acquired 71 companies and Amazon has acquired 60 companies, i.e. around 15, 6 and 5 transactions per year on average.

Our main finding is that acquisitions target companies spanning a wide range of economic sectors and whose products and services are often complementary to those supplied by the acquirers. This highlights the complexity of the business models pursued by digital companies, as several activities seem to enter into their productive process. Transactions that can be characterized as more horizontal in nature would seem to be the minority.

We have also analysed the age of the targets at the time of the acquisition and found that targets are four-year-old or younger in nearly 60% of cases. More specifically, the median age of Amazon's targets is 6.5 years; that of Facebook's targets is 2.5 years; and that of Google's targets is 4 years. This may be problematic to the extent that there are considerable difficulties in understanding the competitive implications of acquiring a young firm, as at that stage in their life cycle their evolution is still uncertain and it is therefore very difficult to determine if the target will grow to become a significant competitive force.

1.4. PAST MERGER ASSESSMENTS IN DIGITAL MARKETS BY COMPETITION AUTHORITIES

Over the last decade, CAs have evaluated a number of mergers between digital companies. We have reviewed a subset of these decisions to understand which ToHs have typically been pursued in digital mergers and how the relevant economic features of digital markets have been taken into account. Horizontal ToHs pursued by CAs have included the following:

- network effects have been regarded as a barrier to entry or expansion potentially capable of conferring a significant degree of market power to the merged entity and exacerbating the anticompetitive effects stemming from the loss of competition between merging parties. Multi-homing has generally been regarded as a factor potentially mitigating the adverse impact of network effects;
- mergers involving companies in competition with one another for consumer attention may increase their ability to exert market power within fairly broad online advertising markets, even where the services they supplied to consumers were different and not substitutable to one another;
- even when the merging parties did not significantly constrain one another at the time of the merger, CAs investigate whether they would be likely to do so in the future, assessing the likelihood that one of the merging parties will grow into an effective competitive force and whether there would remain a sufficient number of other existing or potential competitors to maintain competitive pressure after the merger;
- when a merger combined two important innovators, or eliminated a firm with promising pipeline products, CAs evaluated whether the transaction could reduce the merged entity's incentive to innovate.

Vertical ToHs pursued by CAs have included the following:

- network effects, given their potential to represent a barrier to entry or expansion, could increase the likelihood of foreclosure, exacerbating the anticompetitive effects of the merged entity's exclusionary strategies;
- the data a firm owns can enter its productive process in several ways and, depending on how this occurs, the creation of a larger or more diverse dataset resulting from a merger may give the merged entity a competitive advantage potentially capable of foreclosing rivals.

1.5. GENERAL LESSONS FOR THE ASSESSMENT OF MERGERS IN DIGITAL MARKETS

There is a concern that merger policy has put too much weight on the risk of incorrect intervention (type I error) compared to the risk of incorrect clearance (type II error) when assessing mergers in the digital sector, leading to increased concentration in digital markets.

The nature of competition in many digital markets may change the terms of the usual trade-off between type I and type II errors. Network effects often make the structure of digital markets quite concentrated and barriers to entry rather high. Big data may contribute to such outcomes, to the extent that the data endowments enjoyed by incumbents provide a competitive advantage that makes it even more difficult to challenge them. The main mechanism left to discipline incumbents is that of competition *for* the market, i.e. that potential and actual entry mitigate the ability of incumbents to exert market power. This makes potential competitors even more valuable than they usually are in traditional markets. As a result, type II errors may be particularly costly. In other words, certain features of digital markets may justify some changes in the way mergers in the sector are typically assessed.

Mergers may prevent the development of competitors in two main ways:

- directly, when the incumbent of a digital market acquires an entity that is an actual or potential competitor;
- indirectly, when the incumbent acquires an entity that supplies a complementary product/service, thereby depriving its direct (actual or potential) competitors of the opportunity to improve their products and better challenge the incumbent.

To assess whether a merger will be detrimental to competition, CAs would need to predict the evolution of the target in the absence of the merger, i.e. the counterfactual. This is especially challenging when, as is often the case, targets are young firms at the early stage of their development. In markets as dynamic as digital markets, evolution may be the result of the target's independent decision to change its business model and/or investments made by venture capitalists and/or the decision of other entities in the industry to purchase the target and integrate it in their own operations. In other words, when defining the counterfactual to a merger, CAs may need to consider the ability of the target to develop, on its own or attracting outside resources, as well as the likelihood of an alternative buyer coming along.

Such an exercise is inherently complex. One way to deal with such complexity would be to improve the information set that CAs typically rely on when evaluating mergers. This can be accomplished, *inter alia*, through the following:

- while resource-intensive, it may be helpful in some instances to use dawn raids in the context of merger investigations, as this may uncover valuable evidence such as the future plans of the target and whether the incumbent perceived the target as a threat;
- the value of the transaction will lie somewhere between the current value of the target and the maximum willingness to pay of the acquirer for the target. While incremental profits may derive from both efficiencies and anti-competitive effects, money spent to acquire the target can provide

an insight into the magnitude of these effects associated to the transaction. When particularly high, the value of the transaction may justify a more in-depth analysis of the merger;

- CAs may benefit from a better understanding of the key markets in the digital sector, such as those for online advertising. The effects of mergers involving companies which compete with one another for consumer attention were typically assessed in a very broad market, comprising all or most providers of online advertising space; and a very fragmented one, with several suppliers active in it. Virtually, no merger would raise competitive concern in such a market. This conflicts with the perception that many firms in the digital sector would appear to be holding significant market power, either in advertising or in related businesses. A comprehensive market study into the digital advertising sector could be a good instrument to gain the necessary knowledge for future enforcement activity in the sector.

Moreover, the time frame of two years, which represents the default for the assessment of some future market developments, such as entry, within merger investigations in the UK, may be somewhat limiting and could be extended when dealing with mergers in digital markets: even in the fast-moving digital landscape, becoming successful can take longer than two years.

Even after reinforcing the tools available to CAs, there will always be a certain degree of uncertainty as to the counterfactual chosen for the assessment of a merger. Future plans, no matter how carefully set out, are always subject to being unmade by unforeseen market events. This may mean that CAs would need to be willing to accept more uncertainty in their counterfactual. However, doing so may then result in CAs falling short of the burden of proof they are required to satisfy to block a merger. In other words, for CAs to be more effective in the enforcement of merger policy, it may be necessary to test the boundaries of the legal tests and constraints that CAs face. The characteristics of digital markets, and the shape that competition takes within them, may justify a more risk-taking approach.

PART II. CASE BY CASE REVIEW OF PAST MERGER DECISIONS TAKEN BY UK AUTHORITIES

II.1. INTRODUCTION AND METHODOLOGY FOR PART II

Part II of the report takes stock of the general lessons drawn in Part I to address the two remaining research questions:

- assess the UK cases and evaluate whether the decision that the Authorities have come to was reasonable based on the evidence that was, or would reasonably have been, available at the time (research question 2, or methodology assessment);
- evaluate market evolution following the mergers to ascertain whether the merger has led to a detrimental outcome (research question 3, or market outcome assessment).

The methodology assessment amounts to analysing two key questions:

- were the ToHs pursued by the Authorities addressed correctly?
- was there any other ToH, in addition to those considered by the Authorities, that it would have been reasonable to pursue?

For the market outcome assessment, we evaluate how the markets affected by the mergers have evolved since the merger and rely on qualitative evidence to investigate whether, and to what extent, the merger determined the outcome observed. For each case, we identify the relevant competitive parameters to assess market outcomes and assess their evolution since the merger date. Qualitative evidence coming from industry reports and interviews with merging and third parties are used to appropriately interpret and corroborate the quantitative analyses.

The five UK cases included in the review are *Facebook/Instagram*, *Google/Waze*, *Priceline/Kayak* and *Expedia/Trivago* (analysed jointly) and *Amazon/The Book Depository*.

II.2. FACEBOOK/INSTAGRAM

The merger between Facebook and Instagram was cleared by the OFT on 14 August 2012. At that time, Instagram provided a free mobile photo app allowing users to take, modify and share photos on Instagram itself or on other social networks, making Instagram also an input to social networks; whereas Facebook was a digital platform supplying social networking services and had recently launched a mobile photo app, Facebook Camera.

The main ToHs investigated by the Authorities are as follows:

- the merger would have made the competitive constraint that the parties exerted on each other in the market for the supply of photo apps disappear. This was dismissed based on the existence of several relatively stronger competitors that constrained Instagram more than Facebook and on the limited attractiveness of photo apps (including Instagram) to advertisers;
- even though at the time of the merger Instagram was not competing with Facebook for advertising revenues and had limited social network functionalities, the Authorities' concern was that this could change in the future. The OFT dismissed this ToH because the available evidence did not show that Instagram was particularly well placed to compete against Facebook in the short run; and there existed other firms that represented the main constraints on Facebook for brand advertising;
- the Authorities were concerned that the merged entity could either prevent or deteriorate the quality of the upload of photographs from Instagram to rival social networks, with the intent of foreclosing Facebook's rivals. This ToH was dismissed as it was assumed that Instagram's appeal was attributable to the possibility to upload photos to other social networks and that therefore limiting this possibility could have caused some users to switch to other photo apps, thus being overall unprofitable for the merged entity.

II.2.1. Methodology assessment

Photo apps were not considered by the Authorities to be *per se* attractive to advertisers since users spent a limited amount of time on them; this argument was crucial for the dismissal of the actual competition in the supply of photo apps ToH. However, the opinions collected by the Authorities were not unanimous on this point. The data available shows that Instagram did generate significant user engagement compared to other photo apps and other social networks at the time of the merger.

Given the evidence that was available to them, the Authorities might have also underestimated Instagram's potential to grow into a significant competitive force in the supply of social networking services.

The key argument for the dismissal of the foreclosure of rival social networks ToH was that the incentive to engage in a foreclosing strategy was missing as Instagram's popularity would have likely been negatively affected. However, the Authorities might have sought to ascertain the extent to which Instagram's popularity hinged on the ability of users to interact with other social network.

Most importantly, however, the Authorities failed to analyse the factors that drive the choices of the demand in the online advertising market. This could have affected the assessment of the two unilateral effects ToHs discussed above and made the set of ToHs considered by the Authorities incomplete. We identify three factors that seem to play a particularly important role in making one provider of advertising space more or less attractive from the perspective of advertisers:

- user base's exclusivity. If certain users can only be reached by advertisers on one platform as they spend most of their time on it, clearly that platform has market power towards the advertisers interested in reaching those users;
- platform's size. Larger platforms are more attractive to advertisers since they reduce the necessary transaction costs to reach a certain number of users and they remove the inefficiencies that might derive from placing ads on two or more independent platforms with potentially overlapping users, which might imply that some users end up being inefficiently over reached;
- ability to target ads. Information on users' behaviour collected by digital platforms provides insight into users' preferences and can be used to better target ads.

The merger could have caused competitive harm to the extent that it could increase the merged entity's ability to exert market power by increasing user base's exclusivity. Moreover, the merger may have deprived other market participants of the opportunity to increase their size and better target ads to compete more effectively in the social network market.

II.2.2. Market outcome assessment

After the acquisition by Facebook, Instagram has rapidly evolved to a different product, which offers fully-fledged social network functionalities, such as direct messaging, photo tagging, and allows advertisers to place their ads on the platform. Facebook has contributed to Instagram's growth by providing improved physical infrastructures, as well as its expertise in the social networks and advertising market.

The number of Facebook users has been relatively stable over time, while the number of Instagram user has doubled in the same period, moving from 14 million in March 2015 to 26 million in September 2018. In terms of time spent by users, Facebook has lost ground with respect to other social networks: the share of time spent by UK users has fallen from 86% in 2015 to 58% in 2018. Instagram share has instead increased, going from 4% to 11% over the same period. Snapchat is the only other social network that is emerging as the most significant challenger to the merged entity, with a share that has reached 18% in 2018.²

On the other side of the market, Facebook's advertising revenue increased significantly despite the drop in time spent, and the gap between Facebook and other social networks has widened. Instagram started to monetize in the UK in 2015, and since then its revenues have increased significantly – as occurred for the number of users – exceeding the revenues earned by other platforms. The advertising revenue per hour spent on Facebook and Instagram is significantly larger than that of their rivals, suggesting that the merged entity is able to command higher prices. This may be a result of the efficiencies achieved through the merger and/or of the exercise of market power by the merged entity.

Indeed, the merger has likely contributed to improving the position of the merged entity across many of the factors relevant to advertisers:

- Facebook uses and merges data from its own website and company-owned services (including Instagram and WhatsApp), obtaining a richer information set that is valuable for targeting of ads;
- Facebook no longer faces the competitive constraint that might have been exerted by Instagram on users who cross-visit the two platforms;

² The evolution of the merging parties after the merger has been evaluated with respect to a market for social networks which comprises those platforms that (i) enable the connection and interaction among users and, as a result, (ii) can leverage a deep understanding of users, their connections and their preferences when selling advertising space.

- Facebook is able to reach a very wide set of social network users, as most users of other social networks also use Facebook, whereas the opposite occurs to a lesser extent. Thanks to Instagram, Facebook is still able to reach demographics where it has lost ground over the past years.

Assessing whether this could be interpreted as an effect of the Authorities' decision to clear the merger would require identifying what would have occurred to Instagram in the absence of the merger. Had Instagram become a popular social network on its own, Facebook would have faced a strong competitor in the social network market, which the merger has eliminated. Had Instagram been unable to grow on its own, then the merger may still have helped Facebook grow and compete with existing competitors (e.g. Twitter) and new entrants (e.g. Snapchat). In both scenarios, however, the merger has also generated significant efficiencies to the benefit of users and advertisers. The effects of the Authorities' decision to clear the merger depend on the balance between likely anticompetitive effects and efficiencies, which in turn depend on the selected counterfactual: stronger anticompetitive effects are expected had Instagram become a popular social network alone, and in this case efficiencies would have needed to be significant enough to compensate for the loss of competition.

II.3. GOOGLE/WAZE

On 11 November 2013, the OFT cleared Google's acquisition of Waze. Google operated an Internet search engine and sold advertising space on its websites and on partner websites; moreover, it offered Google Maps, a free application providing mapping and turn-by-turn navigation services. Waze provided another turn-by-turn navigation app that was only available on mobile devices.

The Authorities investigated the following ToHs:

- the transaction could significantly affect competition in the market for mobile turn-by-turn navigation applications, with the result of reducing the parties' incentives to innovate and the quality of the service offered to users. This ToH was dismissed because Waze had not reached a user base in the UK that was considered sufficient to build a map with coverage and accuracy comparable to Google's; and because of the existence of other turn-by-turn navigation apps exerting relatively stronger constraint on Google, most notably Apple Maps;
- Waze could represent a disruptive force in the market going forward. The Authorities dismissed this ToH because of the uncertainty in Waze's future growth projections; the scale reached by Waze in the UK was not sufficient for it to benefit from significant network effects that could accelerate its growth; there was uncertainty with respect to the effect of the partnerships that Waze was finalising; and there would have remained other strong competitors.

II.3.1. Methodology assessment

The Authorities may have over relied on the competitive constraint that Apple Maps would have exerted on the merged entity. Apple Maps was only available on iOS devices, which represented 30-31% of smartphone sales in the UK at the time of the merger and could represent an indirect constraint on Google Maps for Android devices only to the extent that Google cannot discriminate between the two OSs. If Google were to lower the quality of Google Maps on Android, for instance by introducing ads (which, being generally considered as a nuisance, would represent a drop in quality) Android users would not be able to switch to Apple Maps. The Authorities could have investigated whether such discrimination was feasible.

Regarding Waze's potential, there were signals that Waze had identified a promising path to growth:

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All in all, there may have been enough evidence for the Authorities to conclude that Waze could have become a relevant competitive force.

Most importantly, the range of ToHs analysed in the decision was incomplete. ToHs developed by the Authorities focussed solely on the effect that the merger could have had on the users' side of the market. However, turn-by-turn navigation apps are provided to users for free and are monetized elsewhere. The Authorities could have explored monetization channels and evaluate whether the merger could have had an adverse effect in the markets where monetization occurs.

II.3.2. Market outcome assessment

Google and Waze both provide turn-by-turn navigation services, which are however fundamentally different in terms of their characteristics. Differently from Google Maps, Waze map is user-generated and is mainly used by heavy drivers. By exploiting their complementarities, the merger between Google and Waze allowed the merging parties to improve their apps and realize some efficiencies.

Since 2012, the number of Waze's active users has increased. Google Maps has remained the main mapping service used, and Waze (now part of Google) represents one of the few alternatives to Google Maps, together with Apple Maps. However, Apple Maps continues to be available only on iOS devices, which may limit the extent to which it provides a competitive constraint on the merged entity.

In its decision to clear the merger, the OFT did not take into account how the services offered through Google Maps and Waze are monetized. However, monetization channels were already relevant then and have arguably increased in their relevance over time. Mapping services can indeed be directly monetized, through advertising displayed in the navigation apps. In addition, mapping services can be monetized indirectly, by collecting, selling or otherwise exploiting location data, which is used by companies also for purposes other than advertising. The merger with Waze might have made Google an even more relevant provider of location data, reinforcing its competitive position for the provision of online advertising across all its services.

There are a number of counterfactuals which could be considered: Waze could have grown on its own, been acquired by other digital companies or would have not been able to survive. However, the evidence gathered on the market outcome evolution after the merger is not sufficient to select one of these counterfactuals as the most likely. In any case, the merger has enabled Google and Waze to exploit their complementarities and generate efficiencies. These efficiencies are clearly merger-specific and should be taken into account when assessing whether the decision has proved to be beneficial or detrimental to consumers.

II.4. PRICELINE/KAYAK AND EXPEDIA/TRIVAGO

On 9 May 2013, the Authorities cleared Priceline.com Incorporated (Priceline) to complete its acquisition of Kayak Software Corporation (Kayak). Priceline's subsidiaries were online travel agencies (OTAs) that allowed consumers to search and book travel services from travel service providers (TSPs) such as hotels, airlines and car rental companies. Kayak was a meta-search site (MSS) allowing users to search and compare prices for hotel rooms, airline tickets, rental cars and other travel services. The

crucial difference between the parties' businesses was that MSSs did not have a booking functionality; rather, they referred users either to OTAs' or TSPs' websites, where users could complete their booking. This may have limited substitutability between the two types of services.

The Authorities did not conclude on a precise market definition, but on a cautious basis they assessed the transaction with reference to: (i) online advertising services to UK-based hotels and car hire firms by OTAs and MSSs in the UK; and (ii) online travel search services for UK-based consumers relating to hotels and car hire by OTAs and MSSs in the UK. In addition, the OFT noted that besides this potential horizontal overlap, the parties also had a vertical relationship, which may be characterized as MSSs providing advertising services to OTAs.

The main ToHs investigated by the Authorities are as follows:

- the transaction could lead to price increases or degradation of quality in the supply of online advertising services by OTAs and MSSs to hotels and car hire companies, and/or degradation of quality in the supply of online travel search services to consumers. These ToHs were dismissed since the increment in market share or revenue brought about by the transaction was minimal due to Kayak's small share of supply at the time of the merger, according to market shares computed based on net revenue, volume and gross booking value (GBV). In addition, the merging parties were not generally identified by third parties as each other's closest competitors;
- the merger could have provided Priceline with the opportunity to foreclose rivals from both online travel search services to consumers and online advertising services to TSPs using Kayak to bias search results in its favour. The Authorities rejected this ToH arguing that Kayak's usage among consumers would have declined as consumers would have quickly noticed such a bias in Kayak's search results; similarly, OTAs would have abandoned Kayak generating losses that would have likely outweighed gains; finally, Kayak was not a must-have website for other OTAs to generate traffic to their websites, implying that the foreclosing strategy, even if implemented, was not considered sufficient to give rise to an SLC.

The transaction whereby Expedia, an OTA, acquired control of Trivago, an MSS, in March 2013 was not assessed by the Authorities as the transaction did not meet the UK turnover test nor the share of supply test. There is thus limited scope for a methodology assessment of the decision, since this does not include any substantive assessment of the merger. However, due to the similarities between this transaction and the one involving Priceline and Kayak, the transaction will be discussed in the context of the market outcome assessment, jointly with *Priceline/Kayak*.

II.4.1. Methodology assessment

The dismissal of the unilateral effects ToHs rested mainly on market share evidence. However, the market share analysis as carried out by the Authorities is likely to be affected by a significant measurement problem. Indeed, even if users, or a subset thereof, perceived OTAs and MSSs as substitutes, the range of services they supply would remain different. This difference entails that OTAs' costs are substantially larger, as are the commissions typically charged to TSPs. This makes revenues difficult to compare across the two types of services. Hence, Kayak's small share of the market in terms of revenue may not have corresponded to a likewise minor role vis-à-vis consumers. On top of this, the Authorities could have more thoroughly investigated the nature of the relationship between MSSs and OTAs as horizontal effects can only arise in mergers that involve competitors. A better understanding could have been obtained by simply analysing how users of these services behave, for instance investigating what portion of traffic to OTAs' and TSPs' websites was generated by MSSs.

The dismissal of the foreclosure ToH hinged, *inter alia*, on the ability of users to promptly recognize bias in search results and switch away from a Kayak website favouring Priceline's offers. However, such an assumption does not seem to be supported by the evidence. Indeed, the evidence mentioned by

the Authorities was consumers' tendency to visit at least three websites when comparing and choosing travel products. On the other hand, there is pervasive evidence that consumers tend to focus their attention, and clicks, on results at the top of search results pages, in particular for travel websites. In addition, the Authorities did not consider that the average consumer might not be aware of the brands that are under the control of the same entity, which is arguably a necessary condition for them to notice that Kayak is favouring Priceline's offerings.

The range of ToHs investigated by the Authorities could have been incomplete had the Authorities found that the prevalent relationship between OTAs and MSSs was of a horizontal nature. In this case, the Authorities might have investigated whether the user bases of Priceline and Kayak were such that their combination created a sizable share of users shopping only through these two suppliers, which would have become exclusive to the merged entity post-merger. The transaction could have then given the merged entity the ability to charge higher prices to TSPs and other OTAs, in line with the economic literature on competitive bottlenecks.

II.4.2. Market outcome assessment

Although there exist different OTA groups that provide online travel services through several brands, Priceline and Expedia hold a significant position as OTAs, and their positions have reinforced over time. When compared to other OTAs in terms of gross booking value, those in the Priceline and Expedia groups seem to be the largest in the UK: Priceline is the largest OTA and the gap with other operators has increased over time, while Expedia is the second largest operator. These OTAs have also significantly expanded in terms of users: after the merger, Priceline users have increased, going from 5 million in September 2012 to 11.8 million in September 2017, while the number of users of Expedia has witnessed a consistent growth starting from the end of 2015, reaching 12.8 million users in September 2017.

The traffic of MSSs' websites has also increased over time, and all MSSs have experienced a growth in the number of users, showing their growing importance for online travel services. OTAs have realized the importance of MSSs and the role they play in channelling traffic to their websites and in recent years many MSSs have been acquired by OTA groups. The acquisition of Kayak and Trivago may have had their rationale in supporting Priceline's and Expedia's respective growth strategies, and one way for the acquisitions to support such plans could have been that of biasing Kayak's and Trivago's search results towards Priceline and Expedia respectively.

Indeed, the *Priceline/Kayak* data collected points towards the existence of a bias of Kayak's search results favouring Booking.com, the main Priceline brand in the hotel segment. However, such bias is unlikely to amount to a foreclosure for two reasons. First, there is a limit to the extent to which results can be biased as at a certain point this would lower the quality of the service provided and entail foregoing traffic and revenues. Second, Kayak has a relatively small share of the MSS market, so the impact of the practice is likely limited.

II.5. AMAZON/THE BOOK DEPOSITORY

On 24 October 2011, the Authorities cleared Amazon's acquisition of The Book Depository International Limited (henceforth "The Book Depository"). The OFT's assessment focussed on the parties' businesses in the online retailing of physical books within the UK, considering separately the effects of the merger for "long tail" titles and best sellers. The Book Depository offered its products both through its website and through Amazon Marketplace.

Given the horizontal nature of the transaction, the Authorities investigated a number of unilateral effects ToHs. In particular, the OFT assessed whether the merger could lead to an SLC mainly through the following mechanisms:

- the Authorities were concerned that book prices would increase as a result of the merger. For long-tail titles, this ToH was dismissed based on the observation that Amazon profitably removed The Book Depository from its pricing algorithm and that diversion ratios between the parties were low. For best sellers, the OFT dismissed this ToH since it found evidence of strong competition on Amazon Marketplace where the parties did not seem to be particularly close competitors; and the results of an illustrative price rise (IPR) analysis pointed to a weak incentive to raise prices post-merger;
- the Authorities explored whether Amazon's recent decision to abolish a minimum spend to qualify for free delivery on an order was influenced by The Book Depository's policy implying that the merged entity could decide to remove this benefit following the transaction. However, the Authorities found that Amazon benchmarked its delivery policy against some key competitors which did not include The Book Depository; and Amazon's delivery policy was applied consistently across all of its media products and it wanted its delivery charges to be uniform across all of its product lines;
- the Authorities assessed whether The Book Depository could expand considerably in the foreseeable future but found that its inconsistent growth in recent years made this unlikely and that a significant degree of competition was likely to persist in the Amazon Marketplace.

II.5.1. Methodology assessment

The assessment of the ToHs pursued by the Authorities seems overall convincing. The evidence collected, indeed, suggested that The Book Depository was not exerting a strong constraint on Amazon, and that other sellers on Amazon Marketplace were likely to exert a stronger competitive pressure.

However, the transaction involved a vertical dimension that was ignored in the OFT's decision. Indeed, Amazon also provided The Book Depository with an important input, i.e. access to a large pool of consumers through the Marketplace. Given the importance of the Marketplace, the Authorities could have investigated whether such vertical relationship could have given scope for strategies aimed at foreclosing the parties' rivals, for instance giving The Book Depository a preferential treatment post-merger, discriminating against other sellers in the Marketplace.

II.5.2. Market outcome assessment

In order to assess whether competition in the online market for physical books was still vibrant after the merger, and whether Amazon has been able to raise the prices, we have looked at the evolution of prices before and after the merger period:

- for a sample of 7,014 books across different books' categories, ranging from best seller to long-tail, prices appear relatively stable after the merger. In particular, average weekly prices have decreased for four weeks after the merger, and then only slightly increased. Nine weeks after the merger decision the average weekly price was 1.52% higher (with respect to the week of the merger decision);
- for a limited set of best-seller titles, average weekly price slightly decreased in the three weeks immediately following the merger, while later increased. Nine weeks after the merger the average weekly price was 3.13% higher (with respect to the week of the merger decision).

In the attempt to mimic a "difference in differences" analysis to provide an indication of the effects of the merger, the set of best-seller titles can be considered as a control group, while the large sample of books can be considered as a treated group. The latter is indeed composed by titles that have been published before the date of the merger, and are still on sale on Amazon website in 2019. It is hence likely that these include deep-range titles, for which the competitive constraint exerted by The Book

Depository at the time of the merger is expected to be higher, and for which the merger effects on price – if any – are expected to be stronger. The comparison between the price variation in the treated and control group, before and after the merger, shows that it is unlikely that the merger has harmed consumers through a substantial price increase of physical books. Data available does not allow us to investigate the effects of the merger on other dimension of competition, such as variety.

II.6. CONCLUSIONS ON CASE BY CASE REVIEW

Despite the depth of the analyses carried out by the Authorities, our evaluation of past merger decisions taken by the UK Authorities has revealed certain gaps in the way these cases were analysed. Such gaps do not undermine the legitimacy of the Authorities' decisions and can be properly perceived today thanks to a better understanding of how digital markets work and the actual behaviour of some market players that was highly uncertain at the time the mergers were investigated.

First, the Authorities have not always consistently framed the competition issues they were looking at in a two-sided setting, focusing their attention on the users' side of the market, somewhat overshadowing other sides of the market. In *Facebook/Instagram*, the Authorities may have placed excessive weight on the functionality offered by the parties' products on the users' side of the market but in a two-sided setting functionalities are not the only important feature: what is also important is the role they perform in platform's monetization strategy. In *Google/Waze*, the Authorities have focussed their ToHs on the users' side of the market, failing to explore the way the services provided by the merging parties were monetized. The sole focus on users may have resulted in the development of an incomplete set of ToHs, overlooking possible ways that the merger could have led to competitive harm.

More generally, current business models and monetization avenues should represent an unavoidable step for the development of a ToH because, quite simply, market power is not exerted for its own sake, but has the ultimate objective of increasing profits. Investigating the monetization strategy is important because it can uncover additional, potentially anti-competitive effects of the merger. Moreover, it can shed light on the rationale of the merger from the parties' perspective, as it will make clear how the target brings value (that is, profits) to the acquirer. However, the Authorities should also investigate the users side of the market as competition problems can lead to non-price effects on users.

Further, the set of decisions analysed has revealed gaps in the Authorities' understanding of digital markets. In *Facebook/Instagram*, the Authorities might have neglected to analyse the factors that drive advertisers' choices, how the merging parties fared with respect to each of them, and how their combination could have resulted in competitive harm. In *Priceline/Kayak*, the Authorities did not determine whether the services supplied by MSSs and OTAs should be regarded as substitutes or complements, which may have led to measurement problems in the assessment of unilateral effects through market share evidence. In *Amazon/The Book Depository*, the Authorities neglected the existence of a possible vertical relationship between the merging parties, which may have called for the investigation of foreclosure ToHs.

In the assessment of potential competition, and most notably in *Facebook/Instagram* and *Google/Waze*, the Authorities identified the correct evidence and found that Instagram and Waze had witnessed constant and significant growth in the years leading up to the merger, had promising business models and plans for an expansion that might have increased their relevance in the markets where their acquirers were active. Yet, the Authorities dismissed this evidence mostly due to the uncertainty surrounding whether Instagram's and Waze's potential would have been realized. Rarely, if ever, will the Authorities find conclusive evidence of future growth: potential competition ToHs will always entail a certain degree of uncertainty. If the Authorities wish to pursue this type of ToH in the future, then they should be willing to accept a greater degree of uncertainty in their evaluations.

While we have identified some gaps in the way that the Authorities analysed these cases, it is not always clear whether competitive harm has arisen as a result of such gaps. The decisions taken in *Facebook/Instagram* and *Google/Waze* may have represented missed opportunities for the emergence of challengers to the market incumbents but have also likely resulted in efficiencies. The decisions taken in *Priceline/Kayak* and *Amazon/The Book Depository* appear less controversial, as the level of competition in the markets concerned does not seem to have been substantially affected by the mergers.

Recommendations

- Network effects often make the structure of digital markets quite concentrated and barriers to entry rather high, making competition *for* the market the main mechanism left to discipline incumbents and potential competitors particularly valuable. Thus, the social costs of an incorrect clearance may be higher in digital markets than they are in traditional markets, which may justify a different approach to digital markets.
- Defining the counterfactual to a merger is always complex, but may be especially so when one of the merging parties is a very young firm at the early stage of their development. Yet, predicting evolution is essential to understand whether the transaction will harm competition. Predicting evolution may benefit from improving the information gathering powers of the Authorities, for instance by using dawn raids in the context of merger investigations.
- The time frame of two years, which represents the default for the assessment of some future market developments, such as entry, within merger investigations in the UK, may be somewhat limiting and could be extended when dealing with mergers in digital markets: even in the fast-moving digital landscape, becoming successful can take longer than two years.
- The Authorities may benefit from a better understanding of the markets for online advertising. These markets are particularly important, as they represent the way many digital services are monetized, yet the competitive dynamics prevailing therein are not well understood. A comprehensive market study into the digital advertising sector could be a good instrument to gain the necessary knowledge for future enforcement activity in the sector.
- There is a large number of transactions being undertaken by digital incumbents. The value of the transaction may help the Authorities screen among those transactions to identify those that may warrant a more in-depth analysis of the merger, since it represents the magnitude of the effects (both beneficial and detrimental) associated to the transaction.
- The Authorities would need to be willing to accept more uncertainty in their counterfactual. Even after reinforcing the tools available, there will always be a certain degree of uncertainty as to the counterfactual chosen for the assessment of a merger. Future plans, no matter how carefully set out, are always subject to being unmade by unforeseen market events.
- A more speculative counterfactual may result in the Authorities falling short of the burden of proof they are required to satisfy to block a merger. However, for the Authorities to be more effective in the enforcement of merger policy, it may be necessary to test the boundaries of the legal tests and constraints that the Authorities face.
- The Authorities have not always consistently framed the competition issues they were looking at in a two-sided setting, focusing their attention on the users' side of the market, somewhat overshadowing other sides of the market. The sides of a market need to be looked at jointly, as choices made by the platform on the various sides are interdependent.
- Current business models and monetization avenues should represent an unavoidable step for the development of a ToH because, quite simply, market power is not exerted for its own sake, but has the ultimate objective of increasing profits. Investigating the monetization strategy is important also because it can shed light on the rationale of the merger from the parties' perspective, making clear how the target brings value (that is, profits) to the acquirer.

**PART I. GENERAL LESSONS FOR MERGER CONTROL IN
DIGITAL MARKETS**

I.1. INTRODUCTION AND METHODOLOGY FOR PART I

I.1. The Competition and Markets Authority (henceforth “CMA”) appointed Lear to carry out a study aimed at evaluating past merger decisions in the digital sector (“UK cases”) taken by the Office of Fair Trading (“OFT”) and the Competition Commission (jointly, the “Authorities”). The objective of the study is threefold:

- review merger cases undertaken by Competition Authorities (“CAs”) and the relevant economic literature to identify which Theories of Harm (“ToHs”) have been typically pursued by CAs in relation to these mergers, how such ToHs have been evaluated and which relevant economic features should be taken into account (research question 1);
- assess the UK cases and evaluate whether the decision that the Authorities have come to was reasonable, evaluating whether ToHs have been investigated correctly and whether any potentially relevant ToH has been omitted from the Authorities’ analysis (research question 2, or methodology assessment);
- evaluate market evolution following the mergers to ascertain whether the merger has led to a detrimental outcome (research question 3, or market outcome assessment).

I.2. Part I of the report addresses the first research question, drawing on various sources of evidence. Section I.2 includes a review of the relevant economic literature, highlighting those common features of digital markets that CAs should take into account when dealing with mergers in the sector. Indeed, digital industries create challenges for competition policy, such as how to deal with network effects, multi-sidedness, big data and rapid innovation. All of these features may call for a tailored approach when reviewing mergers in the sector.

I.3. Section I.3 looks at past acquisitions undertaken by a selected set of large digital companies, i.e. Amazon, Facebook and Google, regardless of whether such transactions were subject to ex-ante merger control by any CA. Companies active in digital markets are remarkably active in mergers and acquisitions, and in some instances this may have the intention or effect to wipe out potential competitors. This may be especially problematic in digital markets where the competitive constraint on incumbents may often come from smaller market players or potential entrants. Understanding what sort of companies are targeted by large digital companies may provide an insight into whether such transactions should be looked at more carefully by CAs.

I.4. Section I.4 reviews a subset of mergers in the digital sector that have been scrutinised by CAs. Merger decisions taken by CAs represent a valuable basis to understand which ToHs may be typically pursued within the context of mergers in the digital sector and how the relevant economic features of digital markets have been taken into account by CAs.

I.5. Finally, section I.5 brings all of the above together to draw general lessons for merger control in digital markets.

I.2. SURVEY OF ECONOMIC LITERATURE

I.6. Digital industries create new challenges for competition policy. The survey of the economic literature dwells on some key characterizing features of digital markets that shape the policy debate: network effects, multi-sidedness, big data and rapid innovation. These characteristics make it efficient and/or more likely to have market concentration. Also, they reduce the beneficial effect of unfettered competition. While there is no one-size-fits-all framework, with different markets characterized by different combinations of the above features, the literature review tackles them in isolation.

I.7. This summary includes key concepts, findings and broad economic intuitions. The interested reader is referred to Annex A for an in-depth treatment.

I.2.1. *Direct and indirect network effects*

I.8. In its simplest incarnation, the term “network effects” refers to the fact that in some markets, a firm’s total demand or market share has a *direct* effect on consumption value. For instance, the value of joining a social media platform or a communication service is clearly increasing in the number of other users a consumer can potentially interact with. Digital markets almost always feature network effects. The reason being that firms active in these markets typically leverage on technology to enable users to interact among themselves. For this reason, these firms are typically referred to as “platforms.”

I.9. In some markets, the link between market share and consumption value is subtler. Network-like effects sometimes arise due to what some economists refer to as demand-driven dynamic economies of scale or “learning by doing.” For example, search engines’ users typically do not care directly about the engine’s market share. However, the quality of search results is intimately connected to the scale of operations. Search engines typically “learn” about relevance of URLs to particular queries by observing and analysing users’ behaviour on search result pages. URLs that are clicked more often are obviously more likely to be relevant. More users therefore imply more accurate results and that quality is, in turn, increasing in market share.

I.10. In some other markets, typically referred to as “multi-sided markets,” network effects are “indirect” in the sense that they link different groups of economic agents. A classic example is that of operating systems (“OSs”) such as Google’s Android or Apple’s IOS. Users value choice. Thus, systems that boast more apps are clearly more attractive. Vice-versa app developers value access to larger users’ pools. Nobody wants to incur in the fixed cost of developing an app for a system that only a few adopt. Another important example is that of “attention platforms”. These are typically content providers (say online news, portals, blogs, social media etc.) that harvest user attention and resell it to advertisers. Advertisers typically prefer to reach larger pools of users. So, a broader audience increases the advertisers’ willingness to pay. Consumers instead typically “dislike ads”; in other words, in this illustration externalities from advertisers to consumers are negative. Markets where the value that users on one side of the market assign to the platform depends on how many users on *other* sides of the market also patronize the platform is called “multi-sided” following a literature pioneered by Caillaud and Jullien (2003); Rochet and Tirole (2003, 2006) and Armstrong (2006).³

I.11. Network effects are an obvious source of concentration due to a “rich get richer” dynamics, whereby more users enhance the dominant firm’s attractiveness leading to even more users. In extreme cases, markets tip to monopoly. Furthermore, concentration is also efficient, but its benefits have to be weighed against its costs due to market power.

³ More policy-oriented early contributions are Evans and Schmalensee (2005) and Evans (2003).

I.12. As the overarching goal of competition is that of alleviating the social harm caused by market power, many papers use the monopoly paradigm as their benchmark. A first observation in the context of a monopolistic platform, as formalized in Box A.3 in annex A.1.1, is that network effects reduce the extent of market power, defined as the ability to raise prices above costs. The reason is that monopolists internalize the positive effect of expanding their installed base on their customers' willingness to pay. To see this via an extreme example, suppose that some service, which is costless to provide, works at all only if some critical mass is reached and that critical mass is 100%. In this case, monopolists would be willing to price down to zero if that is necessary to reach that mass. A very general and robust message in the literature is that network effects lead to smaller mark-ups, thus mitigating the pernicious effects of market power. Classic papers making these points are Liebowitz and Margolis (1994) or, more recently, Levin (2011).

I.13. The fact that these services are often offered for free does not mean that concerns over concentration are unfounded. Platforms have incentives to exert their market power in dimensions other than price. For instance, they may fiddle with the quality of the service in order to raise revenues by either distorting consumer choices towards more profitable ones or directing consumer attention away from what is best for them. To fix ideas, think about a search engine that has the ability to manipulate its search results, say by directing user clicks towards affiliated websites or towards advertisers. Similarly think about a streaming service such as YouTube or Spotify, who can use its recommendations, playlists and auto-play features to promote specific titles that are either relatively cheaper to stream or sponsored. Finally, consider a social network manipulating the newsfeed in order to keep consumers engaged. The economic literature has looked at the concept of "intermediation bias" and its consequences. The basic trade-off platforms face is between revenues per interaction and quantity of interactions (Hagiu and Jullien (2011)). Bourreau and Gaudin (2018) and Calvano and Jullien (2018) look at biases within widely used recommender systems. In a series of papers, De Corniere and Taylor (2014, 2016) study the determinants of such bias and its consequences. The first paper looks at search engine bias and its effect on websites' strategies. The latter generalizes some of the ideas, looking at an intermediary who is willing to divert uninformed consumers in exchange for a price. For a more thorough discussion of the impact of network effects on market power see Annex A.1.1.

I.14. The more recent academic debate on platform competition takes as given that network effects lead to market tipping and looks at the potential of competition *FOR* the market to discipline incumbents. The idea is that in a world with rapid innovation, potential and actual entry possibly mitigate the social costs of market power.

I.15. The more recent literature introduces and studies the notion of "incumbency advantage." It captures the idea that an installed base of consumers may prevent entrants from penetrating the market despite being endowed with better quality products. That is, there is an incumbency advantage if, despite the fact that if all consumers switched to some entrant their willingness to pay would be strictly larger, the entrant fails to conquer the market. Some early contributions refer to this as "excess inertia."

I.16. The three key questions that arise in this context are: what is the *source* of the incumbency advantage? How and to what extent can such advantage be *exploited* to extract supra competitive rents? Are there factors that can mitigate the anticompetitive potential of network effects?

I.17. Three important early contributions by Farrell and Saloner (1986), Katz and Shapiro (1992) and Fudenberg and Tirole (2000) pointed at switching costs. The basic idea is that consumers cannot change their mind. So those adopting earlier technologies are "stranded" in case a new, perhaps superior technology arises at some later stage. However, switching costs seem less relevant in the online world, where competitors' product are at one's fingertip and installing an app or signing up on a website does not require to invest in new equipment or sink in time to learn new skills. With the

exception of personal data (treated in detail below),⁴ these frictions are very low. Therefore, the more recent literature has been relooking at the incumbency advantage issue in this frictionless context.

I.18. A common theme in current work is the idea that consumer “expectations” over who will dominate the market can be thought of as a competitive asset. The idea is that consumers who expect a dominant firm to keep being dominant, might collectively fail to migrate to some “better” entrant’s platform, simply because they have a hard time coordinating their choices. That is, simply because they expect others not to migrate. To tackle these issues, Caillaud and Jullien (2003) and, more recently, Halaburda, Jullien and Yehezkel (2016) and Halaburda and Yehezkel (2016) developed the notion of “focality”. That is, they explicitly formalize the intuition that incumbents face favourable beliefs. Halaburda, Jullien and Yehezkel (2018), Halaburda and Yehezkel (2016) and Biglaiser and Cremer (2018) recently relooked at this issue embedding dynamic considerations. They look at competition between an incumbent and a sequence of potential entrants over a large number of periods. These papers deliver three clear messages. First, favourable expectations lead to a quantifiable incumbency advantage much as more traditional and well understood sources like switching costs. Incumbency advantage can thus materialize despite frictionless contexts. Second, when one embeds dynamic considerations, competition for the associated “incumbency rents” dissipates most of this advantage. The idea is that higher quality entrants can always bribe consumers to switch to their service by offering some very low (even negative!) introductory prices. The prospect of future incumbency rents is what makes current losses optimal. In short: these long-run considerations make entrants very aggressive. Third, despite being mitigated, the static inefficiency extends to the dynamic setting: focal, lower quality incumbents can stay dominant.

I.19. A key mitigating factor often cited in policy debates is multi-homing. The low prices (often nil) and low switching costs to access other service providers in digital markets brought about the widely documented habit of trying out new services *before* quitting the old ones or patronizing two competing platforms at the same time. Consumers who are not required to “abandon” the network of the incumbent to try out new services are obviously easier to persuade to jump onboard an entrant’s platform. Armstrong (2006) studied competition in a model where one set of users always multi-homed while the other was assumed to single-home introducing the well-known notion of “competitive bottleneck”. Since acquiring single-homers allows to extract fat monopoly rents on the opposite side of the market, there will be fierce competition for single-homers and no competition for multi-homers. The more recent literature on multi-homing in multi-sided markets looks at this issue from different angles. Some recognize that the choice to multi- or single-home is often endogenous (for instance Tremblay and Jeitschko (2018)) and look at the determinants on that choice. Others contrast outcomes in the competitive bottleneck model, with those in the two-sided single-homing model. These latter could be induced by exclusivity clauses (Carroni et al. (2018), Peitz and Bellaflamme (2018)). Annex A.1.2 examines in depth the literature around the notion of incumbency advantage.

I.20. Finally, the literature review considers factors that potentially allow more platform to cohabit *despite* network effects: network interconnection and product differentiation. What links these two is the fact that market fragmentation is not necessarily inefficient to start with.

I.21. Compatibility and interoperability are not perceived as a viable option in today’s digital markets arena as it is difficult to define minimal service standards in digital contexts such as, for example, WhatsApp or Instagram. A notable exception to the view that compatibility is not an option is a recent contribution by Gans (2018). The paper puts forward a notion of “identity portability” as a possible policy response. The idea is that individual users should have a “right” to their identity and to its verification if they change digital platforms. A similar proposal, labelled “graph portability”, has been put forward by Zingales and Rolnik (2017).

⁴ Personal data can be useful to an entrant to provide comparable quality and therefore may be a source of switching costs.

I.22. Horizontal differentiation naturally induces market fragmentation, with multiple outcomes active at the same time. Such fragmentation is clearly not suboptimal as different platforms cater to different preferences. Armstrong (2006) and Rochet and Tirole (2003) look at fragmentation/shared market equilibria in two-sided markets.

I.23. More surprisingly, a number of papers show that fragmentation can occur even when platforms are purely vertically differentiated. That is, even in cases where everybody agrees that one platform is “better” than the other and therefore tipping would be socially desirable. Ambrus and Argenziano (2009) show that one can use the “size” of the network in a way akin to quality to screen buyers. Calvano and Polo (2018) go one step further providing a model of strategic differentiation. They show that two otherwise identical platforms can relax competition by cornering different sides of the market. The motivating example are broadcasting markets, where Free-to-Air (FTA) operators cohabit with Pay-TVs. In summary, platform competition may *lead* to endogenous differentiation by business model. This means that platforms apparently catering to clearly different subset of users may be in the same relevant market. For additional details on the factors that allow for competition IN the market in contexts characterised by network effects see Annex A.1.3.

1.2.2. Markets for attention

I.24. A large fraction of the internet is basically powered by advertising money with many websites and apps in the business of harvesting and reselling human attention. These firms, sometimes referred to as attention brokers, are essentially platforms operating in multi-sided markets: advertisers wish to place their creatives on outlets that have a large audience while consumers typically dislike ads.

I.25. However, these markets received a special treatment in the economics literature for a number of reasons that go beyond their obvious relevance. Human attention is scarce and valuable. There are often no prices on the consumer side of the market, so firms do not internalize consumers’ willingness to pay. Multi-homing is widespread, and this makes it difficult to use traditional measures of market power. New technologies that use data to profile users and follow them as they traverse the internet (e.g. cookies) scale down competition for attention at the individual level. Finally, advertising is a key input in product market competition thus allocative inefficiencies in ad markets percolate to product markets.

I.26. Earlier papers looked at broadcasting markets and focussed on market power in contexts where consumers are not charged. An early and influential contribution by Anderson and Coate (2005) provided a first model of “competition” for attention. Specifically, they study the allocative properties of a market with two competing attention brokers such as free news outlets assuming consumers choose one and only one outlet (i.e. they single-home). In line with Armstrong’s “competitive bottleneck” intuition, advertising goes down with competition. To see this notice that since advertising is usually perceived as a nuisance one, can think of the quantity of ads as basically a “shadow price” that consumers need to pay to satisfy their content needs. Competition typically lowers prices and thus the aforementioned result follows.

I.27. A more recent wave of papers relooked at outlet competition under the more realistic assumption that consumers satisfy their content needs on multiple outlets (i.e. they multi-home). This simple fact is shown to have profound implications on how competition works. Multi-homing implies that the rents for reaching the attention of eyeballs “shared” by one or more outlets are competed away. Therefore, the more one’s audience is “shared” with rivals the lower its value on the advertising side of the market. This means that outlets have preferences not only for the audience “size” (how many?) but also on the audience composition (shared vs exclusive). This has implications, not only for

prices and quantities (as discussed in Ambrus et al. (2016) and Anderson et al. (2016)), but also for what concerns the incentives over content provision both in terms of quality and in terms of diversity.⁵

I.28. Prat and Valletti (2018) look at implications of attention market concentration on product markets. Their starting point is that consumer attention is an essential input for entrants in product markets: entrants need to make consumers aware of their existence. They show that mergers between attention brokers indeed might have important effect on consumers via higher product prices. The interested reader is referred to Annex A.2 for a more detailed discussion on the issue of markets for attention.

I.2.3. Innovation in digital markets

I.29. A significant concern when thinking about innovation in digital markets are the causes and consequences of the widespread incumbents' practice of acquiring start-ups active in the same or adjacent markets. This often occurs at very early stages of the product development process, that is before these firms hit the market with a final product. This phenomenon is known in the literature as "entry for buyout".

I.30. In a seminal contribution, Gilbert and Newbery (1982) argued that institutions such as the patent system create incentives for monopoly incumbents to invest in "pre-emptive inventions" in order to protect those monopoly rents. By the same token, monopolists have stronger incentives to acquire entrants than, for instance, venture capitalists, as the opportunity cost of not acquiring is the risk of losing those fat rents. The finding that incumbents have stronger incentives to invest is referred to in the literature as the "efficiency effect".

I.31. Now, suppose that the acquired technologies need to be further developed. If the entrant's product is a substitute of the incumbent's, then some of the sales of the new product will come at the expense of the old. This "rent cannibalization" implies that incumbents have lower incentives than the entrant to invest in further development. In the literature this is Arrow's (1972) famous "replacement effect". If the incentives are sufficiently dampened then these buyouts might end up being "killer acquisitions", where new products are discontinued (or never introduced) upon acquisition.

I.32. Is "entry-for-buyout" pro- or anti- competitive? The "efficiency effect" obviously suggests that allowing buyouts of potential entrants stimulates innovation. Also, Rasmusen (1988) argues that, on the plus side, the possibility of buying out entrants limits the scope for inefficient entry deterrence strategies. However, because the threat to incumbents is higher when the entrant's product is a close substitute to the incumbent's then entrants will invest in duplicative innovation, which is socially wasteful, since it does not lead to new products or lower prices. Finally, as said above, if new products or technologies require further development before hitting the market, they are less likely to be developed by incumbents.

I.33. While the literature provides clear and unambiguous theoretical predictions towards pre-emptive buyouts, there is surprisingly little systematic evidence to date. An exception is a recent paper by Cunningham, Ederer and Ma (2018) that looks at acquisitions in the pharma industry. Because the development of drugs is subject to stringent regulatory requirements, the authors are able to follow it from a very early stage through to launch or discontinuation. Overall, the estimates indicate that 6.4% of all acquisitions in the market are killer acquisitions. Annex A.3.1 contains an in-depth discussion of the literature on for buyout and killer acquisitions.

I.34. Following the *Dow/Dupont* case of 2017, a more recent academic debate relooked at the effect of concentration on innovation contributing to a literature built over two influential early contributions

⁵ See, for instance, Athey et al. (2018) on the theory side and Gentzkow et al. (2014) for an empirical structural application in the US newspaper industry.

by Shumpeter (1942) and Arrow (1962). Classic papers on competition and innovation do not really illuminate the debate on horizontal mergers for a very simple reason: a merger is not just a reduction in the number of firms. The merged entity *combines* the resources of firms that were previously competing. Thus, it can both reorganize production (for instance, by restructuring the R&D process) and coordinate (previously independent) R&D investment and production choices. Very recent contributions along these lines are Jullien and Lefouili (2018), Denicolò and Polo (2018a,b), Federico, Langus and Valletti (2017, 2018) and Motta and Tarantino (2017).

I.35. In theory, when firms use innovation as a way to escape competition, a merger will allow the parties to internalize the negative effects that one's R&D investment has on the expected rival's profit. This internalization trivially leads to a lower overall investment level and therefore to lower innovation rates. In addition, as mergers typically lower the individual firm's output, marginal returns on unit cost-reducing innovations decrease post-merger further strengthening the negative relationship between concentration and innovation.

I.36. As with the literature on unilateral price-effects, sufficiently strong efficiency gains or sufficiently strong and positive R&D spillovers may overturn this finding. However, in this context, things are also somewhat different for the following reason. It makes sense to assume that in industries characterized by rapid innovation and sizeable R&D, the merging parties will each boast a stock of knowledge that they would then share if they were to merge. In turn, this inevitable sharing of technological knowledge, and, more broadly, a reorganization of the R&D efforts across previously independent research labs typically leads to higher incentives to invest. Denicolò and Polo (2018) argue that since these "efficiency gains" are undoubtedly more realistic in this context and their existence should be taken explicitly in consideration by the authorities, as opposed to instead relegating them as mere efficiency defence, despite the obvious difficulties due this information residing within firms.

I.37. The scarce empirical evidence available (Ornaghi (2009), Haucap et al. (2018) and Cunningham et al. (2018)) supports the conclusion that horizontal mergers have a negative effect on R&D.

I.38. By and large the theoretical and empirical literature suggests that the unilateral effects of mergers on innovation, both of the cost-reducing and quality-enhancing types, are anti-competitive. But the nature of R&D makes efficiency gains much more likely to materialize calling for additional scrutiny by the authorities rather than relegating this practice among the "efficiency defences". Annex A.3.2 provides further insights on the debate on the relationship between horizontal mergers and innovation.

1.2.4. Market power, competition and big data

I.39. The quintessential task of many digital platforms is that of making prediction of various sort. Search engines need to predict the relevance of URLs to a consumer query. Matchmakers need to predict the value of a match in order to find good prospects for their users (for instance, employees and employers, single men and single women and so on); content distributors, such as Spotify, need to predict their user tastes to keep them entertained; mapping services need to predict traffic conditions and so on.

I.40. These predictions are made through statistical models (i.e. algorithms) fed by the vast amount of data on consumers that online businesses harness (i.e. big data). Antitrust authorities and practitioners have voiced concerns that big data may be an insurmountable competitive advantage that incumbents naturally enjoy as a by-product of operations. The literature review surveys some recent contributions on this issue.

I.41. The first part of the review introduces the concepts of data substitutability and complementarity in statistical learning theory. Most of the debate hinges on three key issues: (i) returns to scale – that is to what extent increasing the quantity of Data leads to diminishing returns in forecasting accuracy;

(ii) data complementarity – that is what is the effect on accuracy of combining data diverse in nature (for instance, combining geo location data from mapping services and personal information contained in email accounts) and (iii) data substitutability – that is to what extent the incumbent’s data are *essential*.

I.42. Lambrecht and Tucker (2015) argue that big data is not inimitable nor rare. They point to the existence of many alternative data sources and to a flourishing marketplace for data that entrants can access in order to power their statistical models.

I.43. Needless to say, the above are ultimately empirical questions. Surprisingly, despite the wealth of data, there is little systematic evidence to date. Bajari et al. (2018) use proprietary data of Amazon.com to estimate the effect of data scale for the key strategic task of forecasting consumer demand. They confirm that more data enhances accuracy, however, returns to scale are strongly diminishing. Shaefer et al. (2019) investigate how user data improves the quality of internet search results pages estimating a production function for search result quality using real search traffic data from Yahoo!. Again, they document positive but diminishing returns to scale. To date, there is no paper tackling explicitly the issue of data complementarities. Thus, claims that data diversity enhances accuracy are not based on rigorous systematic evidence.

I.44. Finally, the review provides an account of the literature *assuming* that data confers a competitive advantage and looking at the incentives to sell, share or license. In short: what if data is indeed an essential input that only incumbents command? This issue has been extensively studied in papers on vertical restraints (Hart, Tirole, Carlton, & Williamson, 1990; Rey & Tirole, 2007 just to cite a few), in the literature on patent licensing (for instance Gallani, 2002) and in the literature on premium content distribution in media markets (Armstrong, 1999). Chicago-style arguments typically suggest that if data licensing creates value, then absent contractual frictions we should expect firms to share the essential input and bargain over how to share the extra value so created.

I.45. More recent contributions look for reasons why the market may fail to efficiently allocate data linked to its peculiar nature. Rubinfeld and Gal (2017), Prufer and Schottmüller (2017) and DeCorniere and Taylor (2019) characterize and discuss inefficient outcomes in data markets. DeCorniere and Taylor (2019) go one step further, focusing on mergers and looking also at how these vertical agreements affect incentives the incentives to collect data, say by providing some free service in an unrelated market. The interested reader is referred to Annex A.4 which discusses the crucial role played by big data in digital markets more thoroughly.

I.3. OVERVIEW OF TRANSACTIONS CARRIED OUT BY DIGITAL COMPANIES

I.46. Companies active in digital markets are remarkably active in mergers and acquisitions (“M&A”), constantly seeking out interesting start-ups and purchasing them. Such acquisitions may have a variety of purposes: for instance, they may have been conducted to secure a technology to be incorporated into the acquirer’s product; or to secure highly skilled staff and use their expertise to develop products. However, such acquisitions may also have the intention or effect to wipe out potential competitors, as discussed in section I.2.3 and in Annex A.3.1. Buying out firms at an early stage of their development may effectively prevent them from ever becoming a competitive threat, as the innovation that they were developing will not serve to displace incumbents but will rather be instrumental to maintaining their market leadership or will be discontinued altogether.

I.47. This may be especially problematic in digital markets. As discussed in section I.2.1 and in Annex A.1.2, the prevalence of network effects makes it so that often competition is *for* the market rather than *in* the market. The threat exerted by smaller market players or potential entrants is therefore essential to keep market power in check. If such threats can be easily dealt with through targeted acquisitions, they cease to discipline market behaviour and leave room to the exercise of market power. Moreover, most of this M&A activity occurs below the radar of competition authorities, as the large majority of transactions carried out by digital companies do not meet the relevant thresholds for merger control. Indeed, merger control thresholds are often based on merging parties’ turnover, which are rarely met when targets are start-ups that in some instances are still trying to figure out a viable path to monetization.

I.48. For the reasons outlined above, it is interesting to analyse the characteristics of M&A activity carried out by digital companies to understand whether they reveal any reason for concern. Our analysis covers all the publicly disclosed acquisitions carried out by Amazon, Facebook and Google between 2008 and 2018, listed in Annex A. Amazon, Facebook and Google were chosen for consistency with the analysis undertaken in Part II, where we assess mergers that involved these three companies (*Facebook/Instagram*, *Google/Waze* and *Amazon/The Book Depository*). Over this period, based on the information available, Google has acquired 168 companies, Facebook has acquired 71 companies and Amazon has acquired 60 companies.

I.49. The objective is to understand the characteristics of the targets through two main approaches:

- desk research to understand what the main activity of the target was at the time of the merger, based on the description of the target available from Crunchbase⁶. Targets have then been grouped into clusters that convey the general area of economic activity of the target;
- collecting the Crunchbase tags for each transaction. The list of targets has been matched with the Crunchbase database to obtain all the tags that Crunchbase has associated to that company, which provide an insight into the area of economic activity that the target was active in. This analysis is shown in Annex C.

I.50. The two approaches are complementary. On the one hand, the Crunchbase tags, while not always accurate, have the advantage of being multi-dimensional, as each target has a number of tags attached to it. On the other, while clustering should be more precise as it is informed by additional desk research, it requires to make a judgment, catching only one dimension of what the target did at the time of the merger. Such a judgment will invariably be somewhat arbitrary.

⁶ Crunchbase is a platform for finding business information about private and public companies (<https://www.crunchbase.com/>). Where necessary, information available on Crunchbase has been complemented with other publicly available sources

I.51. Table I.1 below shows the clusters defined for the analysis, along with the number of transactions falling into each cluster.

Table I.1: Clusters for analysis of past acquisitions by Amazon, Facebook and Google

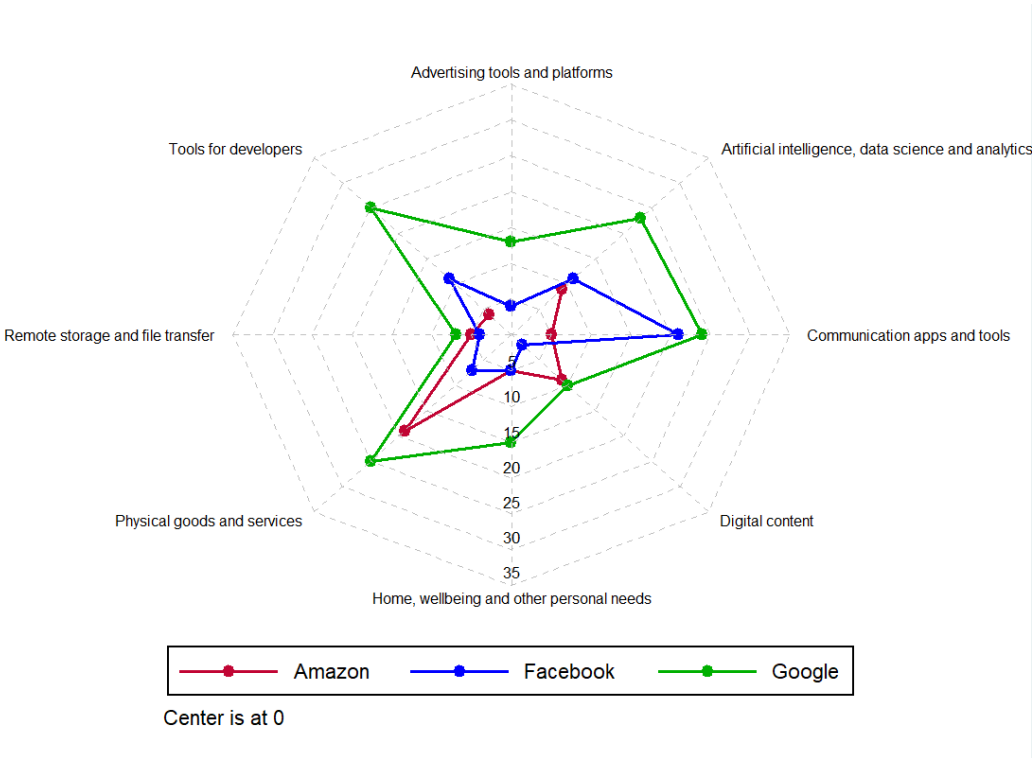
Cluster	Description	Number
Communication apps and tools	Companies active in the supply of platforms that create or simplify ways of interaction between individuals and/or within organizations. Such ways of interaction include direct communication, such as messaging and emailing, and sharing of content and personal information	50
Tools for developers	Companies that provide tools and solutions for software developers to create and optimize their digital products. This excludes products and services supplied to final consumers	40
Physical goods and services	Companies that manufacture, distribute or sell physical goods of any kind or facilitate through services and software such activities, including price comparison websites, marketplaces and online retailers	51
Digital content	Companies that deliver, create or facilitate the fruition of digital content such as movies, games, digital text and other digital media	21
Remote storage and file transfer	Companies that provide file storage, cloud, file sharing and related services	16
Advertising tools and platforms	Companies active in the advertising industry as provider of advertising content, advertising platforms or active as intermediaries between advertisers and consumers or advertisers and suppliers	17
Artificial intelligence, data science and analytics	Companies active in the creation, distribution or enhancement of self-learning software, image, speech or text recognition software, virtual assistants, analytics and machine learning services for big data	43
Home, wellbeing and other personal needs	Companies active in the provision of software and applications designed to simplify and/or improve experience for different aspects of daily life such as: transportation, health, learning, entertainment, wellbeing and home automation	25
Other		36
Total		299

Source: Lear based on Crunchbase data

I.52. Figure I.1 below shows the distribution of transactions across clusters for each of Amazon, Facebook and Google, excluding the *Other* cluster. Google has been remarkably more active than Amazon and Facebook, having bought out more companies than the other two in each of the cluster. In relative terms, Figure I.1 suggests a relatively strong focus by Amazon and Facebook on *Physical*

goods and services and Communication apps and tools respectively, whereas Google’s acquisitions are more evenly spread out across clusters.⁷

Figure I.1: Distribution of past acquisitions by cluster



Source: Lear based on Crunchbase data

I.53. This finding is confirmed by the tag cloud analysis shown in Figure C.1, Figure C.2 and Figure C.3 for Amazon, Facebook and Google respectively. Amazon and Facebook especially seem to have acquired companies that were active in the same area of economic activity, respectively: *e-commerce* and *shopping* for Amazon and *social media* and *social network* for Facebook. On the surface, these transactions may be the most problematic from a competition perspective, as they may be more horizontal in nature⁸ and are precisely those that may have the intention or effect of preventing competitors from becoming a threat.

I.54. However, most transactions do not have a clear horizontal element for each of Amazon, Facebook and Google. Acquisitions target companies spanning a wide range of economic sectors and whose products and services are often complementary to those supplied by Amazon, Facebook and Google. This highlights the complexity of the business models pursued by digital companies, as several activities seem to enter into their productive process.

I.55. This is again confirmed by the tag cloud analysis. All of Amazon, Google and Facebook have propelled their push into mobile also through the acquisition of companies that have helped with the development of services optimized for use from mobile devices (*mobile*, *Android* and *iOS* are rather

⁷ Facebook’s distribution would likely be even more skewed towards the *Communication apps and tools* if transactions were weighed using the value of the transaction, due to the high-profile acquisitions of Instagram and WhatsApp. However, information on the value of the transactions is not available in a consistent manner.

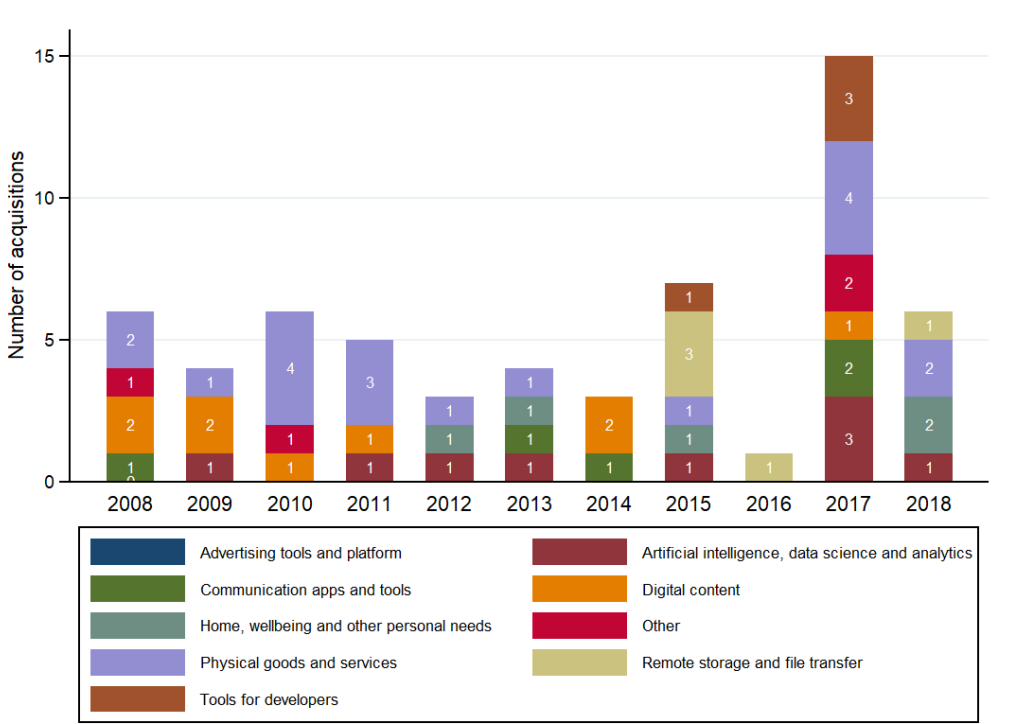
⁸ This is not necessarily the case as the area of economic activity is at most a proxy of actual or potential substitutability. Products may for instance lie in different steps of the value chain or perform different functions.

frequent tags). These mergers may have improved their ability to compete as the competitive landscape moved away from desktop and on to mobile. This was while users of digital services progressively shifted from the desktop to the mobile environment with the number of mobile users growing from almost 15 million in 2010 to more than 45 million in 2018 in the UK.⁹

I.56. Moreover, all of Amazon, Google and Facebook have invested into companies that have helped them with advanced data analytics techniques (*machine learning, artificial intelligence, analytics and big data*). This is consistent with the fact that these companies heavily rely on predictions to provide their services (see section I.2.4 and Annex A.4 for a discussion). For instance, Amazon uses them to manage its stock based on expected demand; Facebook to propose targeted content and ads to its users; Google to improve its search algorithms and target ads more accurately. If this is the case, then broadly speaking these mergers may be efficiency-enhancing as they enable incumbents to become better at making such predictions.

I.57. Figure I.2, Figure I.3 and Figure I.4 show how the number of acquisitions and their distribution across clusters has evolved over time, for each of Amazon, Facebook and Google.

Figure I.2: Number of acquisitions by Amazon over time



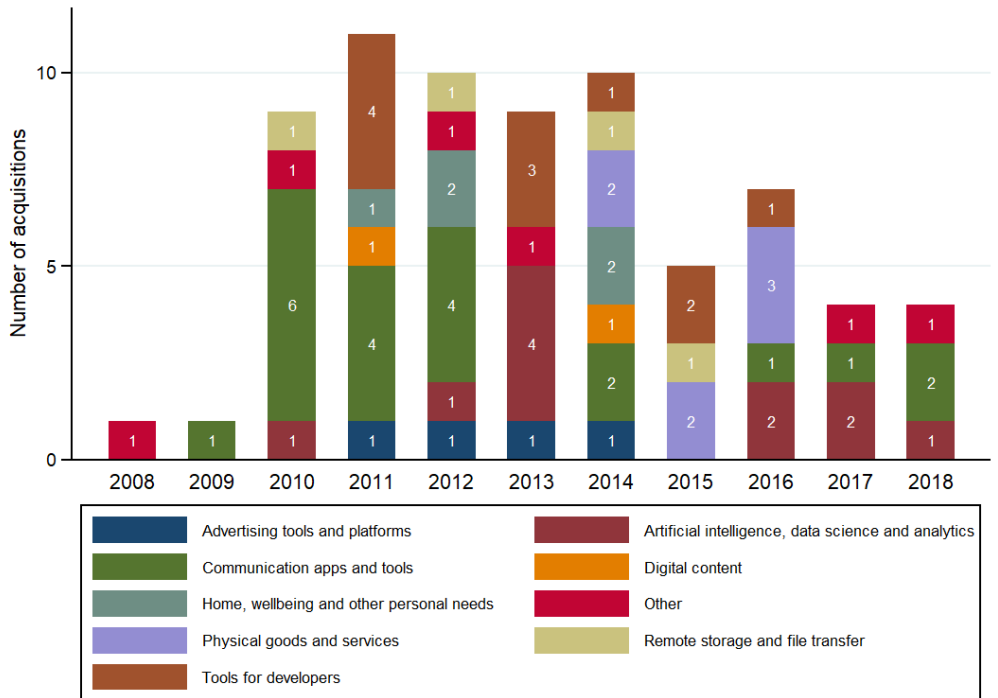
Source: Lear based on Crunchbase data

I.58. Amazon’s acquisitions are clustered in the latter part of the period, with a peak in 2017. Between 2008 and 2013 Amazon completed several acquisitions in the *Physical goods* cluster; most of these were acquisitions of retail operators such as Buy VIP in 2010 and LoveFilm and The Book Depository in 2011. Starting in 2015, Amazon acquired companies in the *Remote storage and file transfer* cluster, perhaps with a view to bolster its own operations in this sector, where Amazon is active with Amazon Web Services. Other notable acquisitions by Amazon include Whole Foods Market, a supermarket

⁹ This is based on data from eMarketer.

chain, acquired in 2017 for 13.7 billion and Zappos, an online shoes retailer acquired in 2009 for 1.2 billion.

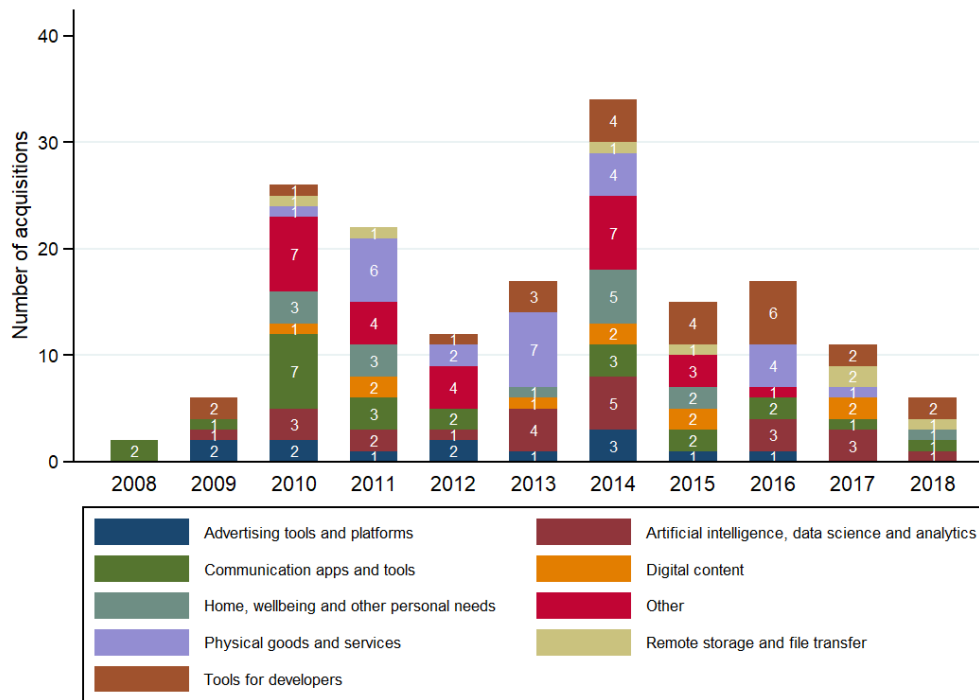
Figure I.3: Number of acquisitions by Facebook over time



Source: Lear based on Crunchbase data

I.59. Facebook has been remarkably active between 2010 and 2016. In the years 2009-2012, Facebook has expanded its presence in the *Communication apps and tools* cluster with the notable acquisitions of the messaging app Beluga (2011), later transformed into Facebook Messenger, and Instagram (2012). Over the period 2014-2016, Facebook has invested in companies related to virtual reality technologies such as Oculus (2014) and Surreal Vision (2015).

Figure I.4: Number of acquisitions by Google over time



Source: Lear based on Crunchbase data

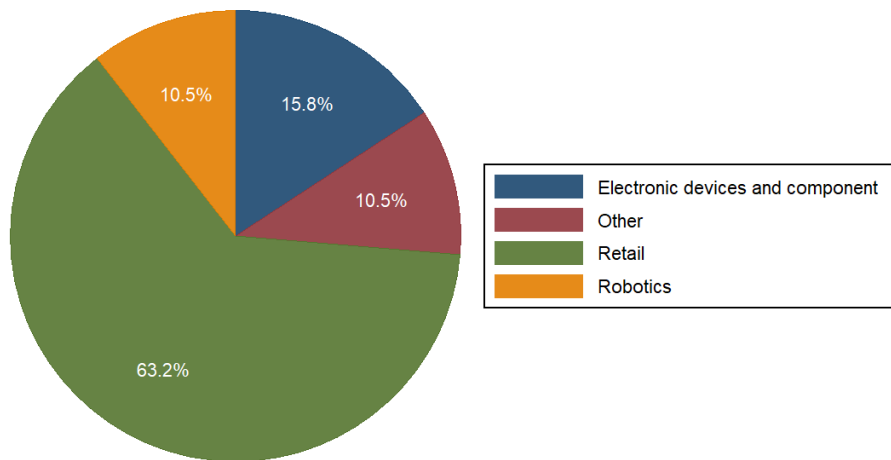
I.60. Google has been active throughout the whole period with a peak of M&A activity in 2014. Google’s acquisitions do not follow a recognizable pattern and seem to be spread evenly across years and clusters. However, the period 2013-2016 was marked by a number of acquisitions in the *Tools for developers* cluster presumably to sustain Google’s push into the mobile landscape that was expanding rapidly in those years. Finally, Google invested in *Artificial Intelligence data science and analytics* consistently throughout the period with the most notable acquisition being DeepMind in 2014.

I.61. Figure I.5 and Figure I.6 go one step deeper, showing a second-level categorization for, respectively, acquisitions by Amazon in the *Physical goods and services* cluster¹⁰ and acquisitions by Facebook in the *Communication apps and tools* cluster.¹¹ A similar analysis was not carried out for Google since its acquisitions are not focused on any cluster.

¹⁰ *Robotics* is defined as machines and part of machines designed for automated operations of any kind; *Electronic devices and components* are defined as companies that produce, distribute or sell electronics devices of any kind including parts and technology for electronic devices; *Retail* is defined as companies active in the retail sale of physical goods online and offline and companies active as intermediaries or facilitators between final customers and retailers.

¹¹ *Aggregators* are defined as platforms that combine notifications, news and updates from various social networks or websites into a single feed; *Direct messaging and calls* are defined as applications that enable the exchange of text messages and/or to call other people; *Email and office communication* is defined as software designed to improve or simplify the use of emails and to optimize workplace productivity by means of enhanced communication. *Topic specific platform* are defined as online platforms where users that share a common, specific interest can post content and communicate with each other; *photo apps* are defined as apps that allow taking, sharing and/or editing photos.

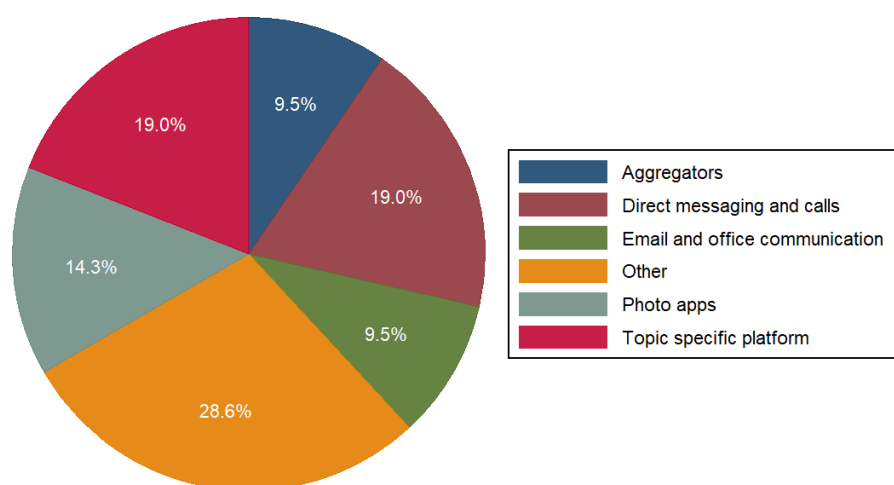
Figure I.5: Distribution of acquisition by Amazon in *Physical goods and services* cluster



Source: Lear based on Crunchbase data

I.62. Amazon's acquisitions in the *Physical goods and services* cluster represent 32% of its total acquisitions. Most of the companies acquired in this cluster were linked to the retail sector, such as Zappos, an online shoes retailer, Whole Food Market, a high-end online and offline groceries retailer, Souq.com, an online retailer active in the Middle-East region and other companies active in the retailing of books and other products (e.g. The Book Depository, Avalon Books, Audible.com). Amazon's interest in *Robotics* may be due to the process of automatization of its distribution centres: for instance, Kiva System, acquired in 2011, provided Amazon with the technology for automated storage and retrieval systems.

Figure I.6: Distribution of acquisition by Facebook in *Communication apps and tools* cluster

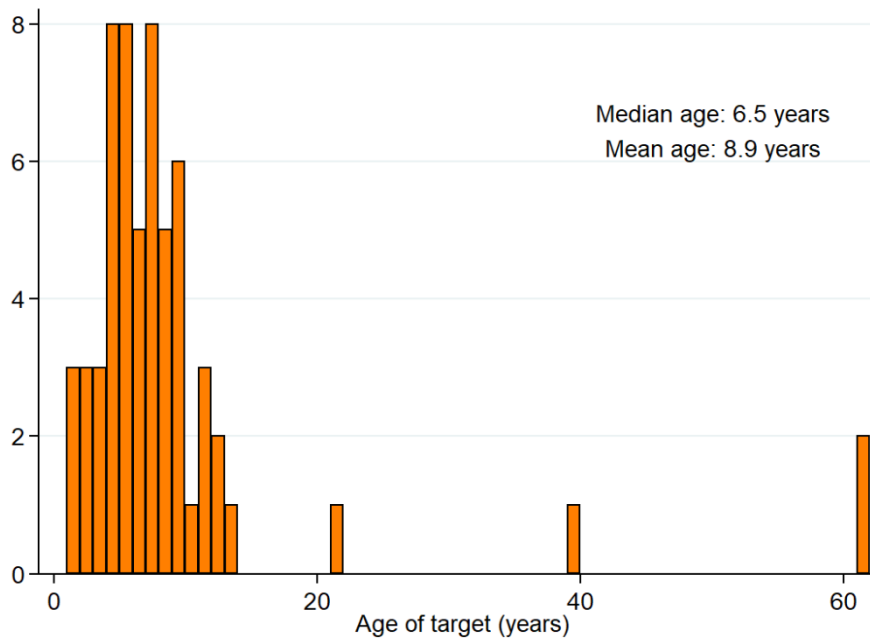


Source: Lear based on Crunchbase data

I.63. Facebook's core business as a social network requires its users to be able to engage between each other and share files and information. Therefore, it is not surprising that Facebook invested heavily in the *Communication apps and tools* cluster, which represents 30% of acquisitions. The most notable acquisitions were Instagram (2012) in the *Photo apps* cluster, WhatsApp (2014) in the *Direct messaging and calls* cluster messaging and Friendster (2010) and Hotpotato (2010) in the *Topic specific platform* cluster.

I.64. Another striking feature of acquisitions carried out by Amazon, Facebook and Google is that their targets are often very young firms. Figure I.7, Figure I.8 and Figure I.9 show the distribution of the age of the targets at the time of the acquisition, expressed in years, for Amazon, Facebook and Google respectively. While there are some outliers, targets are four-year-old or younger in nearly 60% of cases.

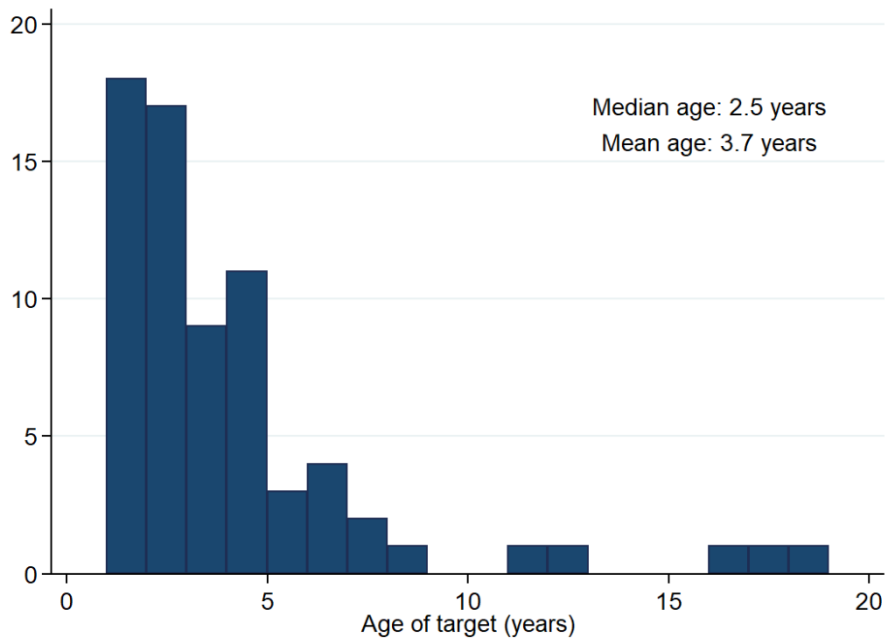
Figure I.7: Age distribution of Amazon's targets



Source: Lear based on Crunchbase data

I.65. Amazon's relatively high mean age of companies acquired is the result of three acquisitions of long-established retailers: Avalon Books and Toby Press were publishing houses founded in 1949 and 1950 respectively, Whole Food Market was founded in 1978. Most of the companies acquired by Amazon were between five- and nine-year-old, which suggest the intention of buying relatively more established firms rather than new-born start-ups. Notable exceptions were Lexcycle and Stanza, active in the eBooks sector, which were acquired in 2009 when they were two- and one-year-old respectively.

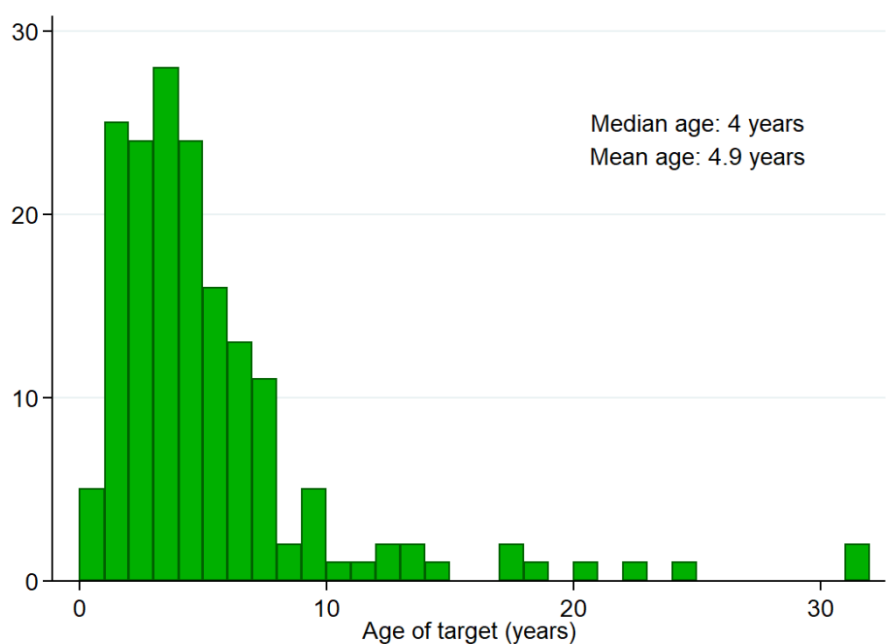
Figure I.8: Age distribution of Facebook's targets



Source: Lear based on Crunchbase data

I.66. Facebook's mean age of companies acquired is significantly lower than Amazon's or Google's. The majority of Facebook's acquisitions targeted companies less than four-year-old. This is particularly evident for Facebook's push into virtual reality, accomplished through the acquisition of three companies (Oculus VR, Surreal Vision and Two Big Ears) less than three-year-old. Finally, all acquired companies in the *Photo apps* and *Direct messaging and calls* clusters were less than three-year-old, with the only notable exception being WhatsApp, which was five-year-old.

Figure I.9: Age distribution of Google's targets



Source: Lear based on Crunchbase data

I.67. Google's acquisition pattern is more heterogeneous than Amazon's or Facebook's. 88% of Google's acquisitions regards firms younger than nine-year-old, with roughly 55% of these being younger than four-year-old. Each cluster shows a similar pattern to the overall distribution described: this can indicate a diversified expansion strategy aimed at acquiring both young, riskier start-up as well as firms in a later stage of development. As an example, in the *Artificial Intelligence, data science and analytics* cluster Google has acquired Flutter, a young start-up for gesture recognition, for 45 million dollars, and Like.com, a 24-year-old company specialized in image recognition, for 100 million dollars.

I.68. To sum up, the analysis of the past acquisitions carried out by Amazon, Facebook and Google reveals the following:

- the volume of transactions is significant. Over the period under analysis, Amazon, Facebook and Google have acquired 5, 6 and 15 companies per year on average;
- most transactions would seem to have a non-horizontal nature, though with notable exceptions;
- targets are typically very young firms, four-year-old or younger in nearly 60% of cases.

I.69. As the analysis in Part II will demonstrate, there are considerable difficulties in understanding the competitive implications of acquiring a young firm, as at that stage in their life cycle their evolution is still uncertain and it is therefore very difficult to determine if the target will grow to become a significant competitive force. Moreover, while non-horizontal mergers present significant scope for efficiencies, the realization of these efficiencies may enable incumbents of digital markets to preserve their leadership and preventing other market players from challenging them. This will be discussed further in section I.5.

I.4. PAST MERGER ASSESSMENTS IN DIGITAL MARKETS BY COMPETITION AUTHORITIES

I.70. Over the last decade, competition authorities have evaluated a number of mergers between digital companies. These mergers represent only a subset of all those that have occurred in digital markets, as can be inferred from the analysis of past transactions presented in section I.3. However, these merger decisions represent a valuable basis to understand which ToHs may be typically pursued within the context of tech mergers and how the relevant economic features of digital markets discussed in section I.2 and in Annex A more thoroughly have been taken into account by competition authorities. In limited cases, the review includes merger decisions which did not concern digital markets but that may nevertheless provide valuable insight into relevant ToHs for the sector.

I.71. The discussion is organized around the two main groups of ToHs. In particular, section I.4.1 considers unilateral effects ToHs usually associated with horizontal mergers, while section I.4.2 discusses foreclosure ToHs, which typically arise when there exists some form of complementarity between the products of the merging parties, either because one is an input for the other or because they are consumed together. Within these two groups, we identified sub-categories of ToHs in order to isolate some themes that are recognised as being relevant in the context of digital markets. The other main group of ToHs, i.e. coordinated effects, is not discussed because there are few cases where these were explored by CAs: while digital markets arguably make it easier to coordinate because of greater transparency and of the ability to monitor and punish deviations promptly, the prevalence of network effects leads to market structures characterized by the presence of strong market leaders: in this context, coordinated effects are less relevant.

I.72. This review is not meant to be exhaustive; the cases included represent examples of instances where relevant themes in the context of digital markets have played a prominent role in merger assessments. These cases are listed in Table I.2, along with an indication of the sections where they are discussed.

Table I.2: List of cases included in review

Case	ToH and section
<i>Facebook/WhatsApp</i> ¹²	Loss of competition with network effects and multi-homing, section I.4.1.1 Loss of competition in markets for attention, section I.4.1.2 Big data as an essential input to compete, section I.4.2.2
<i>Microsoft/Skype</i> ¹³	Loss of competition with network effects and multi-homing, section I.4.1.1 Foreclosure with network effects and multi-homing, section I.4.2.1
<i>SeLoger/Logic-Immo</i> ¹⁴	Loss of competition with network effects and multi-homing, section I.4.1.1 Foreclosure with network effects and multi-homing, section I.4.2.1
<i>Microsoft/LinkedIn</i> ¹⁵	Loss of competition in markets for attention, section I.4.1.2 Foreclosure with network effects and multi-homing, section I.4.2.1 Big data as an essential input to compete, section I.4.2.2
<i>Google/DoubleClick</i> ¹⁶	Loss of potential competition, section I.4.1.3 Big data as an essential input to compete, section I.4.2.2
<i>IRI/Aztec</i> ¹⁷	Loss of potential competition, section I.4.1.3
<i>Dow/Dupont</i> ¹⁸	Loss of innovation, section I.4.1.4
<i>Bayer/Monsanto</i> ¹⁹	Loss of innovation, section I.4.1.4
<i>Medtronic/Covidien</i> ²⁰	Loss of innovation, section I.4.1.4
<i>Apple/Shazam</i> ²¹	Big data as an essential input to compete, section I.4.2.2
<i>Just Eat/Hungryhouse</i> ²²	Loss of competition with network effects and multi-homing, section I.4.1.1
<i>Verizon/Yahoo</i> ²³	Big data as an essential input to compete, section I.4.2.2
<i>Microsoft/Yahoo! Search Business</i> ²⁴	Big data as an essential input to compete, section I.4.2.2

Source: Lear

¹² Commission Decision of 3 October 2014 in Case M.7217 – Facebook/WhatsApp.

¹³ Commission Decision of 7 October 2011 in Case M.6281– Microsoft/Skype.

¹⁴ Autorité de la Concurrence Decision n° 18-DCC-18 of 1 February 2018 on the acquisition of sole control of the company Concept Multimedia by the Axel Springer Group.

¹⁵ Commission Decision of 6 December 2016 in Case M.8124 – Microsoft/LinkedIn.

¹⁶ Commission Decision of 11 March 2008 in Case M.4731 – Google/DoubleClick.

¹⁷ CMA Decision of 20 October 2014.

¹⁸ Commission Decision of 23 March 2017 in Case M.7932 – Dow/Dupont.

¹⁹ Commission Decision of 21 March 2018 in Case M.8084 – Bayer/Monsanto.

²⁰ Commission Decision of 28 November 2014 in Case M.7326 – Medtronic/Covidien.

I.4.1. Unilateral effects ToHs

I.73. Unilateral effects typically arise when merging parties are active in same relevant market, thus supplying substitute products. In this context, competition authorities assess the extent to which the removal of the competitive constraint that merging parties exert on one another may lead to the merged entity gaining market power. The nature of digital markets has entered into such assessments:

- network effects may reinforce the loss of competition between merging parties, leading to market tipping. This may be mitigated by multi-homing behaviour by users. This is discussed in section I.4.1.1;
- digital companies often operate in two-sided markets supplying different products to users but potentially competing with one another to raise advertising revenues, and therefore competing to harvest users' attention. This is discussed in section I.4.1.2;
- digital companies are significantly active in M&A, being constantly on the lookout to buy out interesting start-ups, as analysed in section I.3. In some cases, as discussed in section I.4.1.3, this has led competition authorities to consider potential competition ToHs;
- finally, given its importance in digital markets, section I.4.1.4 discusses how mergers can lead to reduced innovation.

I.4.1.1 Loss of competition with network effects and multi-homing

I.74. As discussed in section I.2.1 and in Annex A.1, network effects arise when the value of a product or service to its users increases with the number of other users of the product or services: as the network becomes more popular, more people join, making the network further attractive, in a positive feedback loop. Some digital markets that are typically characterised by network effects include social networking services, communications services and online platforms bringing together buyers and sellers. The mere existence of network effects in a market does not *a priori* indicate that a merger in this market raises competitive concerns. Yet, concerns may follow if network effects allow the merged entity to foreclose competitors or make it more difficult for competing providers to expand their customer base, i.e. raising barriers to entry or expansion. For their potential to confer the merged entity a significant degree of market power, network effects are sometimes central to some ToHs considered by competition authorities in their assessment of digital mergers. Multi-homing, i.e. the practice by users of using different services from competing providers at the same time, has generally been regarded as a factor potentially mitigating the adverse impact of network effects on competition (see section I.2.1 and Annex A.1.2 for a discussion).

I.75. In *Facebook/WhatsApp*,²⁵ the Commission explored the role of network effects while assessing the merged entity's ability to exert market power in the market for consumer communications services. At the time of the merger, Facebook was a two-sided platform offering social networking, consumer communications and photo/video sharing functionalities, on one side of the market, and online advertising space on the other, collecting most of its revenue from advertisers interested in reaching Facebook's users. WhatsApp was the provider of a leading mobile app for consumer communications services, and at the time of the merger was not raising advertising revenue. The parties' consumer communications apps, namely Facebook Messenger and WhatsApp, were therefore directly competing with each other. The Commission analysed whether the larger network that would

²¹ Commission Decision of 6 September 2018 in Case M.8788 – Apple/Shazam.

²² CMA Decision of 16 November 2017.

²³ Commission Decision of 21 December 2016 in Case M.8180 – Verizon/Yahoo

²⁴ Commission Decision of 18 February 2010 in Case M.5727 – Microsoft/Yahoo! Search Business.

²⁵ See section 5.1 of *Facebook/WhatsApp*.

result from the merger was such that it would substantially increase barriers to entry and confer market power to the merged entity.

I.76. The Commission started noting that these services are indeed characterised by significant network effects, as they generate utility to their users only as long as people they want to communicate with are also users of that service. It follows that the larger the user base is, the greater the likelihood that the people of interest are users of the app and the opportunities for contact acquisition and discovery are. Network effects were thus identified by the Commission as:

- a significant barrier to switching for users. Indeed, the need for the users to recreate their network could make it inconvenient for users to switch to an alternative provider of communications services;
- a barrier to entry and expansion for actual or potential competitors. Likewise, the presence of established players with a large user base may represent a significant barrier to entry and expansion as any actual or potential competitor would have to attempt to replicate these networks in order to become attractive to consumers.

I.77. Both parties had large networks of users: in July 2014 WhatsApp had close to 600 million users and Facebook Messenger's user base was [250-350] million²⁶ worldwide. However, the Commission considered that several factors could mitigate this potentially anticompetitive role for network effects:

- consumer communications services were characterised as a fast-moving sector, where any leading market position, even if assisted by network effects, was unlikely to be incontestable. This view was supported by evidence of a track record of entry by new players;
- users' tendency to multi-home limited the impact of network effects. The Commission observed that the market for consumer communication services featured a significant degree of multi-homing: users of these services had installed and used on the same handset several apps at the same time and they chose which app to use on a communication-by-communication basis, depending on the urgency and nature of the communication and the consumer communications app used by the addressee. Facebook Messenger and WhatsApp, the two apps operated by the merging parties, were the two main consumer communications services simultaneously used by the majority of users: between [20-30]% and [50-60]% of WhatsApp users already used Facebook Messenger and between [70-80]% and [80-90]% of WhatsApp users were Facebook users. The Commission considered this data as an indicator of complementarity in the use of the two apps, as opposed to close competition. Moreover, the Commission observed that multi-homing in this sector was facilitated by several factors which made switching between different providers of consumer communications services quite easy and inexpensive for users, a quite common feature of digital markets, as discussed in section I.2.1 and in Annex A.1.2. These factors included: consumer communications apps were typically offered for free or at a very low price; these apps were easily downloadable and could coexist on the same handset without taking up much capacity; once an app was installed on a device, users did not need to log in each time, so that they could switch from one to another seamlessly; and they were normally characterised by simple user interfaces so that switching required minimal learning costs. Multi-homing therefore mitigated the role of network effects as a barrier to entry or expansion in the market for consumer communications services since having a larger user base did not preclude actual or potential competitors from attracting users;²⁷

²⁶ The range is due to confidentiality.

²⁷ Since the market investigation conducted by the EC revealed that some third parties believed that WhatsApp was already competing with Facebook in the provision of social networking services, in section 5.2 of *Facebook/WhatsApp*, the Commission also examined the horizontal effects of the merger on a broader potential market for social networking services. Including consumer communications apps in the potential market for social networking services implies that the number of providers of these services would substantially increase. In such a broad market, the tendency by users to multi-home would

- whenever anything such as a physical network or a hardware solution needs to be replaced in order to use alternative products, customers may be somewhat locked-in. This was not the case here, as the only factor potentially locking in consumers was the message history they would lose if they changed communications app. However, users typically retain access to message history on their handsets.

I.78. The Commission also investigated whether the transaction could significantly strengthen these network effects. This could have occurred only through some form of integration between the parties' services that would have allowed them to combine their separate networks into one larger network. One form of integration suggested by third parties was cross-platform communication, namely enabling WhatsApp and Facebook users to communicate with each other. In this regard, the Commission noted that such integration would likely entail some technical hurdles, since it would likely require both the parties' users' involvement to match/create their profiles on both platform; indeed, matching WhatsApp users' profiles with their Facebook profiles (or *vice versa*) would be a necessary preliminary step for integration, and it would be complicated without the users' involvement since Facebook and WhatsApp used different unique users' identifiers: Facebook ID and mobile phone number, respectively.²⁸

I.79. Also, enabling cross-platform communication would have required substantial re-engineering of the two services, given their important pre-merger differences. Finally, even if the parties had managed to overcome these difficulties and integrate their services, the net gain in terms of new members to the network would not have been so sizeable given the pre-merger substantial overlap between the parties' networks.

I.80. The Commission had previously assessed another merger involving consumer communications services: the *Microsoft/Skype* case.²⁹ Microsoft, which was active in the design, development and supply of computer software and related services, also operated two communications services: "Windows Live Messenger" (hereinafter "WLM") for consumers and "Lync" for enterprises. Skype offered a software for communications over the Internet. The parties' services presented three main functionalities: instant messaging (IM), voice and video calls. While the Commission did not conclude on whether the market should be fragmented by functionalities, the horizontal assessment focused on video calls since the transaction led to the creation of a market leader only with respect to this service. The Commission considered that network effects represented a barrier to entry and expansion in this market, as suggested by respondents to its market investigation, so that the merged entity's ability to exert market power post-transaction could be strengthened. However, the Commission pointed to the fact that most users make voice and video calls with their "inner circle", usually composed by four to six people, making it easier for these small groups to switch to other providers and mitigating the anticompetitive potential of network effects.³⁰ Moreover, the Commission observed that users multi-home to a certain degree. In particular, the merging parties submitted evidence revealing that [20-30]% of WLM users were also Skype users and that a significant number of Skype IM users were also connected to Yahoo! Messenger, WLM, and AIM and visited Gmail and Facebook.

be reinforced by the high degree of differentiation among the providers of these services, which would make customers use these services in a complementary way, depending on their needs. Based on this, the merging parties were not regarded as close competitors in this broader market encompassing communication apps and social network services.

²⁸ Note, however, that in August 2016, WhatsApp announced updates to its terms of service and privacy policy, including the possibility of linking WhatsApp users' phone numbers with Facebook users' identities. The Commission found that, contrary to Facebook's statements at the time of the merger investigation, the technical possibility of automatically matching Facebook and WhatsApp users' identities already existed in 2014, and that Facebook staff were aware of such a possibility; therefore, the Commission fined Facebook €110 million for providing misleading information.

²⁹ See section 2 of *Microsoft/Skype*.

³⁰ Please see Annex A.1.2 for a discussion on the local nature of network effects.

Users' tendency to multi-home also mitigated the network effects' potential to confer the merged entity market power, since having a large network did not automatically imply that users would give up using competing consumer communications services.

I.81. Network effects play a role also in marketplaces connecting buyers and sellers. In these markets, as discussed in section A.1.1, network effects can be characterised as indirect: these are externalities generated by the intermediation activity carried out by the two-sided platform. In particular, the utility that the buyers derive from using the platform increases with the number of sellers active on the platform, and *vice versa*. The French CA analysed a case involving two such platforms in the *SeLoger/Logic-Immo* decision.³¹ These companies overlapped in the online property ads market, where estate agencies³² interact with Internet users seeking properties for purchase or rental. This market is characterised by cross-side network effects: estate agencies have a preference for portals that have a high audience and visitors have a preference for portals with a large number of property ads. Given the parties' horizontal overlap, the French NCA assessed whether the transaction could lead to horizontal unilateral effects in the online property ads market, in particular through price increases.

I.82. The French NCA also observed that the online property ads market is characterised by multi-homing on both sides of the market: estate agencies publish ads on several portals (multi-publication) and internet users perform searches on several websites (multi-consultation). Multi-publication is particularly facilitated for estate agencies who, differently than private individuals, have access to multi-publication software, specific services that enable estate agencies to insert their ads just once and to publish them automatically on several portals. Multi-consultation by internet users is facilitated by the low costs of making searches and by some services the property ads portals offer which also reduce the search time; users can, for instance, set up alerts enabling them to receive ads for the type of properties they are looking for. The French NCA observed that 50% of Logic-Immo users also consulted four other portals, and 50% of SeLoger users also consulted three other portals.

I.83. To assess the likelihood of unilateral effects, the French NCA went on to compute diversion ratio between the merging parties, since the higher these diversion ratios, the greater the risk of unilateral effects.³³ It noted that multi-publication reduced diversion ratios between the parties and, therefore, limited the merged entity's incentive to increase prices charged to estate agencies post-transaction. The intuition behind this conclusion is that following a price increase by, for instance, SeLoger, no migration of ads from SeLoger to Logic-Immo will be observed if those ads were already posted on both portals due to estate agencies' tendency to multi-publish; if pre-transaction migration of customers from one merging party to the other is missing or at least very low, the unilateral concerns arising from the transaction are also limited.

I.84. Cross-side network effects were also considered for their potential to alter the parties' incentives to increase prices and therefore limit the likelihood of unilateral effects ToHs. Indeed, the French NCA noted that a price increase on one side of the market could alter the attractiveness of the portal on other side. For instance, an increase in the price charged to estate agencies would reasonably lead to a fall in the number of listings published on this portal: cross-side network effects imply that a fall also in the portal's audience should follow. The relevant question was whether this mechanism was in place to such an extent that the price increase would become unprofitable. Therefore, the French NCA tried to assess the extent of these cross-side network effects and noted that:

³¹ See section III.A.3 of *SeLoger/Logic-Immo*.

³² Note that in the decision the French NCA refers to the group of agents who post property ads as "advertisers". For the sake of clarity, this is replaced by estate agencies in this report, but the "upstream" side of the market still comprises other categories of agents trying to sell or rent properties such as private individuals, notaries, brokers etc.

³³ The diversion ratio of a product A to product B indicates the fraction of sales lost by product A subsequent to an increase in its price to product B in the case of a low, but permanent price increase.

- some portals succeeded in capturing a significant number of property listings despite having a limited audience, and they did so by adjusting their prices. An example is provided by Superimmo, a free website for professionals, whose market share in terms of number of ads was estimated at 15%, while that in terms of audience was below 3%. This ability of portals with limited audience to attract a high volume of ads is aided by multi-publication, which allows estate agencies to publish their ads also on portals with limited audience. In other words, multi-publication limited the extent of network effects on the upstream side of the market;
- external shocks leading to a fall in the number of property ads on a portal³⁴ did not consistently lead to a fall in the number of users. For instance, an approximate 30% fall in the number of property ads on Logic-Immo did not lead to a fall in its audience.

I.85. Consequently, while the existence of cross-side feedback effects was not questioned, it was concluded that their extent seemed to be limited on both sides of the market. Therefore, they did not sufficiently limit the merged entity's incentive to increase prices.

I.86. Two-sided markets were also prominent in the CMA's assessment of *Just Eat/Hungryhouse*. The parties were both food ordering marketplaces acting as intermediaries between final consumers and restaurants willing to offer home delivery services, and they were the only two such platforms in the UK. However, the CMA found evidence that other operators, such as Deliveroo and UberEATS, offering ordering and logistics services³⁵ constrained the parties to such an extent that they were to be considered part of the same relevant product market. These two sets of suppliers were jointly referred to as online food platforms and the competitive effects of the transactions were therefore assessed in the market for the supply of online food platforms in the UK. The CMA investigated whether the loss of competition between the parties could allow the merged entity to exert market power at the detriment of both categories of customers, i.e. consumers and restaurants.

I.87. The CMA acknowledged that the interaction between indirect network effects and customers' homing behaviour (i.e. whether they single- or multi-homed) on each side of the market had implications on the nature and level of competition in the market. Indeed, network effects alone, if strong enough, could generate feedback loops making it hard for smaller platforms to survive and ultimately leading to a competition *for* the market dynamics, as discussed in section I.2.1 and in annex A.1.2. However, multi-homing could allow more undifferentiated platforms to coexist. The CMA considered that restaurants multi-homed if they were listed on more than one platform; on the other hand, the observation that a consumer had an account on multiple platforms was not considered a sufficient indication of multi-homing. Indeed, the CMA considered that multi-homing on the consumer side only occurred when consumers used more than one platform in making their purchase decisions. This approach is in line with the literature on "multi-homing in usage" discussed in annex A.1.2.

I.88. In order to understand customers' behaviour, the CMA looked at the proportion of overlapping restaurants and consumers both between the parties and between Just Eat and third-party ordering and logistics specialists such as Deliveroo and UberEATS. In addition, the CMA commissioned two surveys. The main findings of these analyses were the following: the vast majority (92%) of restaurants listed on Hungryhouse were also listed on Just Eat, while the symmetrical figure was just 46%; the overlap between the parties in terms of restaurants listed was stronger than that between Just Eat and the main ordering and logistics platforms; single-homing was more common among consumers than restaurants. The implication of the latter finding was that competition was expected to be fiercer on

³⁴ Examples of external shocks examined include: changes in pricing strategy adopted by certain portals; and the termination of the "P3 offer", which was a particular offer introduced in 2010 combining the property ads of three portals including Logic-Immo.

³⁵ The difference between these operators and the parties is in the range of services offered to restaurants: indeed, they also manage the delivery function on behalf of restaurants.

the consumer side. Indeed, when a high proportion of customers on one side single-home, the platform may exert market power with respect to the other group of customers, as the platform itself becomes the only way to access those single-homing customers. Moreover, the CMA found mixed evidence on the strength of indirect network effects³⁶ which, together with the widespread multi-homing on the restaurant side, made it reject the parties' argument that competition was *for* the market.

I.89. Finally, the CMA considered that when there are strong indirect network effects in both directions, these could generate negative feedback loops if, for instance, the platform increased prices on one side of the market. In other words, similarly to *SeLoger/Logic-Immo*, indirect network effects were regarded as a factor that could potentially limit the parties' incentives to raise prices.

I.90. Based on the above, the CMA rejected this ToH since the available evidence suggested that Hungryhouse exerted a limited constraint on Just Eat and there were other significant competitors in the market.

I.4.1.2 Loss of competition in markets for attention

I.91. Many digital companies operate in two-sided markets where they offer their products or services free of charge to consumers while raising revenues on the advertising side of the market. As a consequence, radically different businesses may still compete with one another for consumer attention as the latter is vital to attract advertising revenues. This is discussed more thoroughly in section I.2.2 and in Annex A.2.

I.92. *Microsoft/LinkedIn*³⁷ represents a good example of this issue since, despite the transaction mainly entailed non-horizontal concerns, the Commission also took into account horizontal effects. Through this operation, Microsoft – whose offerings included, among other things, operating systems (OSs) for personal computers, cross-device productivity applications and online advertising (primarily with its web search engine, Bing) – acquired the professional social network (PSN) provider LinkedIn. The transaction created several non-horizontal relationships; yet, the Commission also investigated a horizontal effects ToH since the merging parties overlapped in the supply of online non-search advertising services.³⁸ Therefore, the Commission investigated whether the merger could raise concerns in this segment of the online advertising market. However, the Commission noted that the parties to the merger were small players in the highly fragmented advertising market led by Facebook and Google. Also, Microsoft's presence was limited to the advertising space offered on its own website,³⁹ while LinkedIn's was just related to non-search advertising on PSNs, a market where Microsoft was not active. Finally, respondents to the Commission's market investigation did not raise concerns, and the possibility that competition issues could come from data combination was also dismissed as discussed in section I.4.2.2.

I.93. Competing to attract consumer attention does not necessarily imply that a company exploits this attention for monetisation purposes. In *Facebook/WhatsApp*,⁴⁰ for instance, WhatsApp was neither selling advertising space nor selling user data. Yet, it did receive potentially valuable consumer attention. The Commission thus considered whether, post transaction, the merged entity could

³⁶ In addition, the CMA noted that the strength of network effects may not be constant over time and it is indeed likely to decrease at the margin, as the industry matures.

³⁷ See section 4.1 of *Microsoft/LinkedIn*.

³⁸ Indeed, Microsoft provided both search and non-search advertising, while LinkedIn was only active in the market for non-search advertising.

³⁹ Indeed, Microsoft had outsourced other non-search advertising activities to Verizon's AOL until 2025, thus withdrawing from selling online display ads.

⁴⁰ See section 5.3.2 of *Facebook/WhatsApp*.

analyse WhatsApp users' data and use them to introduce targeted advertising on WhatsApp. This could have enabled Facebook to reinforce its position in the online advertising market with respect to two different possible counterfactuals:

- one where WhatsApp would have stuck to its pre-merger “no ads” strategy. In this scenario, the abovementioned strategy would have allowed the merged entity to publish ads on two outlets, Facebook and WhatsApp, potentially increasing their effectiveness and therefore making the merged entity more attractive to advertisers than Facebook alone would have been absent the merger;
- one where WhatsApp would have started providing advertising space. In this scenario, the transaction would remove a competitive constraint, potentially giving rise to unilateral effects in the market for online advertising as absent the transaction Facebook would have faced competition from WhatsApp. In assessing this ToH, the Commission noted that this strategy was possible, in theory, although it would have required WhatsApp to change its privacy policy. Nevertheless, departing from the pre-merger “no ads” product strategy might not be profitable for WhatsApp, as some users might decide to switch to other consumer communications apps. Furthermore, the Commission’s investigation revealed that the vast majority of market participants believed that, post-transaction, there would still remain a sufficient number of alternative providers of advertising space competing with Facebook.

1.4.1.3 Loss of potential competition

1.94. The most straightforward ToH that competition authorities consider in the context of a horizontal merger’s assessment is the loss of actual competition: when one firm merges with a competitor, unilateral effects may result, that is, the merged entity may be allowed to exert market power as the competitive constraint that the merging parties exerted on one another is now removed. However, even when the merging parties do not significantly constrain one another at the time of the merger, competition authorities may investigate whether they would be likely to do so in the future. This may occur either because one of the parties is a potential entrant to a market where the other party operates or because one of the parties is a small entrant with significant growth prospects which, if realized, could come to challenge the market position of the other merging party. When a CA finds that merging parties are potential competitors, then it assesses whether the removal of this potential competitive constraint is likely to result in a substantial lessening of competition (SLC).

1.95. Following the Commission’s Guidelines on the assessment of horizontal mergers, for a merger involving a potential competitor to have significant anti-competitive effects, two basic conditions must be fulfilled. First, the potential competitor must already exert a significant constraining influence or there must be a significant likelihood that it would grow into an effective competitive force. Second, there must not be a sufficient number of other potential competitors, which could maintain sufficient competitive pressure after the merger.⁴¹

⁴¹ The OFT’s Merger Assessment Guidelines entail a similar approach to that of the Commission. The OFT envisages two scenarios in which the removal of a potential entrant could lessen competition by weakening the competitive constraint on an incumbent supplier. The first scenario is that of loss of “actual potential competition” and involves a potential entrant that could have increased competition. In assessing whether this scenario leads to an SLC, the Authorities must consider the likelihood of such entry, whether such entry would lead to greater competition, and the existence of other potential entrants. The second scenario is that of loss of “perceived potential competition” where the merger may remove a firm which is not in the market, but which nevertheless imposes an existing constraint because of the threat that it would enter if existing firms in the market raised their prices. Low barriers to entry help make this scenario more likely. In assessing whether a merger involving a perceived potential competitor leads to unilateral effects, the Authorities will consider whether the presence of perceived potential competition resulted in the pre-existing prices of the incumbent firm (or firms) being lower than they would otherwise have been.

I.96. The *Google/DoubleClick*⁴² case provides a good example of this ToH. At the time of the merger, both Google and DoubleClick were active in the online advertising sector. The main players of the sector are web publishers, selling advertising space on their internet pages, and advertisers, buying this space to place their advertisements. Online ads can be categorized according to:

- the selection mechanism: search ads appear next to the results of search queries; non-search ads can appear on any web page and can be further divided into contextual, selected according to the context of the web page on which they appear, and non-contextual ads;
- the format: there can be text ads, exclusively composed by text, and display ads which include additional static or dynamic graphical elements;⁴³
- the distribution channel: advertising space can be sold either directly by publishers to advertisers or through intermediaries.

I.97. Ad intermediaries are platforms that match demand and supply for advertising space. Ad intermediation services are offered by “ad networks” and “ad exchanges”. The main difference between these two categories of agents is that ad networks aggregate publishers’ inventory and re-sell it to advertisers, whereas ad exchanges are virtual marketplaces where publishers and advertisers conclude transactions.

I.98. Once the ad space is sold, advertisers and publishers often rely on ad serving tools to make sure that the correct ad appears (i.e. is served) in the right place of a website and at the right time.⁴⁴ Therefore, there is a vertical link between ad intermediation and ad serving services providers. Various combinations of intermediation services and ad serving technology are available to publishers to sell their inventory, giving rise to bundled and unbundled solutions, also referred to as integrated and non-integrated solutions. In sum, publishers can choose:

- direct sale of ad space and purchase of ad serving services;
- intermediated unbundled solutions, where the intermediary offers no ad serving tool or does not oblige customers to use it;
- intermediated bundled solutions, where intermediation services and ad serving tools are jointly supplied by the intermediary;
- direct bundled sale, where publishers which sell the inventory also provide in-house ad serving technology.

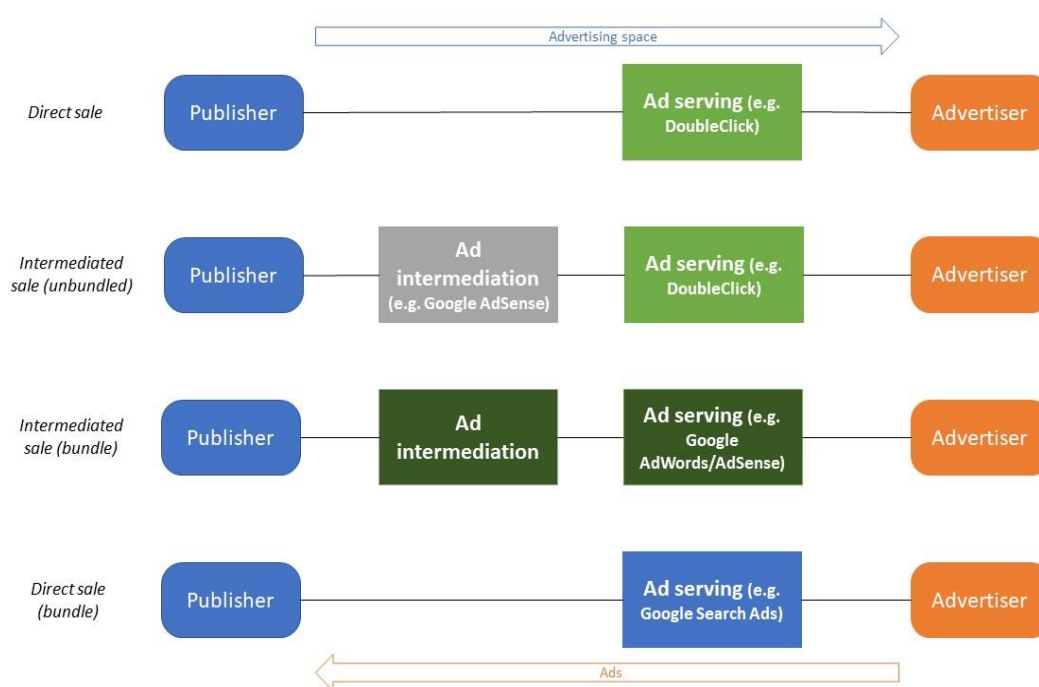
I.99. Figure I.10 below illustrates these combinations of intermediation services and ad serving technology. While bundled solutions were originally developed for search ads, the Commission noted that there had been a trend towards vertical integration for non-search ads as well.

⁴² See section 7.2.2 of *Google/DoubleClick*.

⁴³ Since search ads tend to be almost exclusively text ads, whereas non-search ads can be either text ads or display ads, display is sometimes used interchangeably with non-search advertising, although this terminology is not precise as the two terms relate to different dimensions.

⁴⁴ More precisely, advertisers create advertisements and upload them onto an advertiser-side ad server, publishers enter the campaign terms of the ad (location, price and targeting criteria) into a publisher-side ad server, and when a web page is visited by a user the two sides of the server enter into communication with each other and the advertiser-side ad server chooses the appropriate ad to deliver on the web page.

Figure I.10: Possible arrangements for the supply of ad intermediation and ad serving services



Source: Lear

I.100. At the time of the merger, Google was selling ad space on its search engine website Google.com only for search-based text ads; also, it provided ad intermediation services through its ad network (AdSense), selling both search and contextual text ads on the web pages of the publishers participating in the network; finally, it was offering a bundle encompassing ad space, intermediation services and ad serving tools.⁴⁵ Google was the leading provider of online advertising, and in particular of search ad space in the EEA. DoubleClick offered a display ad serving technology and it held a leading position on both the advertiser and publisher side of the market. Thus, in its merger investigation, the Commission assessed: 1) whether DoubleClick could have become a provider of ad intermediation services and, by extension, could have entered the market for the provision of bundled online ad intermediation and ad serving tools; and 2) whether Google could have become a provider of display ad serving tools. Both moves would have made the merging parties direct competitors, making the merger potentially anti-competitive.

I.101. The Commission noted that DoubleClick had already planned to enter the market for ad intermediation services. This was evident from DoubleClick's internal documents and the fact that the company had already launched an ad exchange platform that it was testing with some customers. The Commission went on to assess: 1) whether it was likely that DoubleClick would have evolved in an effective competitive force; and 2) whether there would have been an insufficient number of other competitors left to provide competitive pressure after the merger. In order to answer these questions, the Commission analysed in depth whether DoubleClick held unique advantages which could favour such a development. The Commission identified three types of possible advantages.

I.102. First, DoubleClick could have leveraged integration between its ad serving technology and ad intermediation services. However, the Commission noted that such a combination would not have been unique to DoubleClick, as the market had witnessed a trend towards vertical integration. In addition, Microsoft and Yahoo!, besides being vertically integrated, also operated a sophisticated ad

⁴⁵ In particular, Google offered "AdWords" for advertisers and "AdSense" for publishers.

search business allowing them to offer a larger bundle also including the provision of search ads spaces. DoubleClick would have been unable to replicate such offer absent the merger with Google.

I.103. Second, DoubleClick could have leveraged its existing customer base as a key asset that would have allowed it to grow into an effective competitor to Google. However, the Commission first noted that the size of this customer base did not seem to be such that DoubleClick would enjoy a significant advantage relative to its future ad intermediation competitors. Moreover, the Commission noted that there would be difficulties for DoubleClick in converting customers of ad serving tools into exclusive intermediation clients as both publishers and advertisers, especially middle and large companies such as DoubleClick's customers, preferred to use a mix of outlets, i.e. they multi-home. Specifically, the Commission argued that if most of DoubleClick's customers were using several ad intermediation platforms, there was no apparent reasons for them to leave these platforms to start exclusively using DoubleClick's new ad exchange. Rather, it was likely that they would have indeed joined DoubleClick's intermediation platform and see if they could get a better price there than with competing intermediators. Thus, the existing business relations did not constitute a significant competitive advantage.

I.104. Third, DoubleClick could have leveraged information about consumer behaviour collected through ad serving services to supply an intermediation service that could not be matched by competitors who do not have access to such data. However, the Commission noted that contractual relations linking DoubleClick with publishers and advertisers severely limited DoubleClick's ability to use this data to deliver services to other advertisers or publishers. The Commission considered that it was unlikely that these contractual restrictions would be removed post transaction: first, DoubleClick probably lacked the ability to impose such changes to its customers, as the available evidence suggested its market power was not sufficient;⁴⁶ second, the existence of an incentive to try to do so was also doubtful, since such a fundamental change was considered a factor that could have persuaded many customers to switch to some alternative provider. Finally, such a data endowment would not have been unique and could be replicated by competitors.

I.105. The Commission concluded that, while it could not be excluded that DoubleClick would have grown into an effective competitor in the market for ad intermediation services, it was likely that a sufficient number of other competitors would continue to exert a competitive pressure to the merged entity post-merger.

I.106. The Commission also considered a second ToH related to the possibility that, absent the merger, Google could have become an effective competitor in the provision of display ad serving tools. In fact, it was working on a new ad serving product which was in the early stages of development. Yet, the Commission found no evidence indicating that Google was likely to grow into an effective competitive force. Indeed, it had no significant experience with display advertising or the advanced metrics required by customers purchasing display advertising.⁴⁷ Also, other potential entrants into ad serving, in particular ad agencies and web portals, were better placed in terms of customer relationships, as they also provided their customers with rich media ads. Indeed, the Commission noticed that recent entrants into the ad serving market included agents belonging to these two categories (among which Microsoft and Yahoo!). Thus, even if Google were to succeed in the development of its display ad serving technology, it would be just one of many competitors.

⁴⁶ Evidence of this kind included the fact that DoubleClick, in the recent past, had had serious difficulties in retaining some customers which were contemplating to switch to other providers, and managed to do so only through substantial price decreases.

⁴⁷ Indeed, the software providing ad serving tools also collects information about the user's online behaviour in the context of the placed ad, exploiting browser cookie technology. Therefore, advertisers can obtain information to monitor the effectiveness of their campaigns, and publishers can monitor the financial performance of the ad space sold.

I.107. Similarly to *Google/DoubleClick*, loss of potential competition ToHs were also explored in the *IRI/Aztec* decision by the CMA. The merging parties overlapped in the supply of electronic point of sale⁴⁸ (ePOS) data gathered from retailers for fast-moving consumer goods (FMCG) for the purpose of market research. Analyses carried out by the CMA suggested that the parties were not close competitors as they specialised in the provision of different types of data, and this evidence was helpful in dismissing the actual competition ToH. Most of the horizontal assessment focused instead on the extent to which the merger could eliminate potential competition in the supply of disaggregated convenience ePOS data and in the supply of aggregated ePOS data.⁴⁹

I.108. The CMA investigated whether, absent the merger, IRI was a potential entrant in the market for the supply of disaggregated convenience ePOS data, where Aztec held a market share of [90-100%]. This ToH was dismissed based on insufficient evidence that IRI would have entered this market: internal documents did not discuss this intention and stressed that IRI's core business was the provision of data relating to the health and beauty sector and it had no interest in the convenience sector. Likewise, the CMA dismissed another potential competition ToH regarding the market for aggregated ePOS data, albeit for different reasons: Aztec had tried in the past to develop a plan to enter this market without success due to the existence of high barriers to entry and was thus considered not to represent a significant competitive challenge going forward.

I.4.1.4 Loss of innovation

I.109. Although there are different views on the relationship between product market competition and innovation, for the reasons pointed out in section I.2.3 and in Annex A.3.2, in recent years the European Commission has investigated whether and how mergers hamper innovation. When a merger combines two important innovators, or eliminates a firm with promising pipeline products, the transaction can lead to a significant impediment of effective competition. While the merger decisions reviewed here do not concern digital markets, they still provide useful insights as to how to assess mergers that threaten innovation and on the remedies that can be adopted to remove the related competitive concerns.

I.110. The *Medtronic/Covidien* decision provides a clear example of how concerns related to innovation can shape a CA's assessment in the medical equipment industry, which shares several features with the pharma industry. Thus, the literature commonly considers this industry as a sector where the loss of innovation ToH naturally applies. The merging parties were active in the medical devices sector. In particular, Medtronic was the market leader in the market for drug-coated balloons to treat vascular diseases. The Commission noted that few companies were active in this market and all of them exerted limited competitive pressure on Medtronic. The target company Covidien was developing its own drug-coated balloon, called Stellarex; this could be considered a late-stage pipeline product. The development of medical devices also entails a number of steps similar to those that will be described with reference to the *Dow/Dupont* case. Clinical trials represent a useful instrument to assess the stage of innovation of medical devices and pharmaceuticals.

I.111. With the first clinical trials ongoing and data available, pipeline products begin to be competitively significant. Clinical trials need to be run with a sufficient number of patients to be reliable. Therefore, they constitute a significant financial investment in the development cost of a new product. In this case, promising clinical trial results suggested to the Commission that Covidien was indeed likely to significantly constrain Medtronic in the near future.

⁴⁸ ePOS refers to a computerized system for recording sales in retail shops, using a laser scanner at the cash till.

⁴⁹ Data from a single retailer, which may help a brand owner understand its sales patterns within that particular retailer, are referred to as disaggregated ePOS data, as opposed to aggregated ePOS data which are useful to provide brand or category level totals for the UK as a whole and are obtained combining data from each retailer.

I.112. The concern was that the transaction could have removed a credible competitor to Medtronic depriving the market of an important innovation; indeed, the merged entity would have had the incentive to discontinue the development of Covidien’s pipeline product, making the transaction classifiable as a killer acquisition. The incentive by an incumbent to discontinue the acquired firm’s pipeline products is discussed in section I.2.3 and in Annex A.3.1.

I.113. In order to ensure that the loss of potential competition and innovation would not materialise, Medtronic committed to selling Covidien’s Stellarex business with all the assets necessary to bring the product to the market. Such assets included manufacturing equipment, related IPRs, scientific and regulatory material necessary to complete the clinical trials, and key personnel. In January 2015, Spectranetics Corporation acquired Stellarex.

I.114. Some more recent decisions by the Commission concerning the agribusiness sector highlight a different way in which horizontal merger may hamper innovation, that is affecting the merging parties’ incentives to innovate post-merger. The *Dow/Dupont* decision formulated this type of loss of innovation ToH for the first time. The transaction involved two large suppliers of crop protection chemicals and would have created a market leader. The parties to the merger competed as vertically integrated developers and manufacturers of pesticides (herbicides, fungicides and insecticides).⁵⁰ Innovation is considered of particular importance for the crop protection industry, which is highly concentrated. Indeed, farmers value new products that are less toxic or more efficient against pests, which may become resistant to existing active ingredients over time. Innovation is therefore crucial to capture sales from competitors and to defend existing sales.

I.115. The idea behind loss of innovation ToHs is that firms not only compete in relevant product markets, but also in “innovation spaces”. The first stage of the innovation space is the “discovery stage”, which requires between three and four years at a minimum. This is followed by the “development stage”, considered to require between five and six years, during which firms experiment with different formulations of active ingredients, and safety, efficacy as well as biology tests are conducted. Finally, R&D activities related to “early pipeline products” are carried out. Competition moves from innovation spaces to product markets when these products develop into “formulated products” and become subject to regulatory approval by agencies such as the US Environmental Protection Agency, or the European Food Safety Agency in the EU.⁵¹

I.116. The Commission’s concern was that the merger threatened innovation competition by:

- removing the parties’ incentives to pursue *ongoing parallel innovation efforts*: the Commission found, indeed, that the parties were competing in important innovation areas. Since innovating in this industry is a lengthy and costly process, the parties would have likely had the incentive to discontinue some of their pipeline products.
- removing the parties’ incentives to develop and bring to market *new pesticides*: the merged entity’s overall incentive to undertake innovation was considered to be lower than the sum of its parts.

I.117. This was confirmed by pieces of evidence such as the parties’ internal documents and analyst presentations mentioning R&D synergies and the removal of duplication. The Commission found that the second effect was likely to be significantly larger than the first one.

I.118. Due to the innovation-related concerns, the Commission conditioned the clearance of the merger on the divestment of DuPont’s global pesticides business, including its R&D division. The hypothesis was that the buyer of this divestment package would be enabled to replace the competitive

⁵⁰ Pesticides are products used in agriculture to control pests that can harm crops. Herbicides are pesticides that control weeds.

⁵¹ The existence and results of the aforementioned tests, as well as the final approval, are all elements that help the reviewer assess the stage of a given innovation and, as a consequence, the potential of the firm producing that product. Such an assessment may be more complicated in other sectors.

constraint exerted by DuPont so that the number of effective competitors in the innovation spaces where DuPont was active would remain unchanged. Including DuPont's R&D organisation and pipeline products was meant to ensure the viability and competitiveness of the divested business in the long run.

I.119. The concern which arose from the *Dow/Dupont* transaction is similar to that assessed by the Commission in the *Bayer/Monsanto* case. This transaction concerned seeds and pesticides. Seeds can be regarded as the most important input for farmers; traits are modifications to the genome of a seed that make the seed tolerant to certain herbicides or resistant to pests. Traits can be found in nature (native traits) or created with the help of biotechnological tools. They qualify as genetically-modified (GM) or non-GM traits depending on the biotechnology used to bring the trait into the seed. Bayer was a diversified company active in the pharmaceuticals, consumer health, agriculture and animal health business. This transaction mainly concerned its agriculture division (the "Bayer Crop Science division"). Bayer Crop Science operated three business segments: (i) Crop Protection (i.e. pesticides); (ii) Seeds and Traits; and (iii) Environmental Science. Bayer was the second largest supplier of pesticides worldwide. Monsanto was an agriculture company producing seeds for broad acre crops, fruits and vegetables as well as plant biotechnology traits. Monsanto was the world number one seeds and traits player. It also supplied pesticide products. The Commission considered that the transaction would have created by some distance the largest global integrated player in the seeds and pesticides sector.

I.120. As in *Dow/Dupont*, the Commission's competitive assessment addressed the overlaps between the parties' activities not only in existing products, but also in areas of innovation where both parties had active R&D projects. The Commission considered that both the traits and pesticides industries had features suggesting that a merger between two of only a few important rival innovators would likely lead to a reduction in innovation competition and gathered evidence supporting this view, including:

- evidence that the parties' pre-transaction incentives to innovate were driven by competition in innovation spaces; in particular, by the prospect of gaining valuable sales from rivals by engaging in successful innovation and, conversely, by the risk that successful innovation by rivals could lead to a loss of market share;
- evidence that the parties did take into account cannibalisation when introducing new products;
- evidence, including patent data, that Bayer and Monsanto were important and close innovators in several innovation spaces where few other alternatives were available.

I.121. The specific product markets where the Commission found that the transaction would have likely eliminated innovation competition were:

- GM or non-GM traits conferring herbicide tolerance or insect resistance; and
- herbicides or herbicide systems (i.e. herbicide combined with a trait conferring herbicide tolerance to a crop),

I.122. The approval of the transaction was conditioned on the divestiture of an extensive remedy package. In particular, Bayer committed to divest:

- almost the entirety of its global broadacre seeds and trait business, including its R&D on GM and non-GM traits;
- its glufosinate assets and three important lines of research for herbicides.

I.123. The Commission concluded that the divestment package would enable a suitable buyer⁵² to sustainably replace Bayer as a competitor after the merger.

⁵² A buyer was also proposed by Bayer itself.

I.4.2. Foreclosure ToHs

I.124. When mergers bring together complementary products, rather than substitutes, a possible effect that is typically investigated in the context of merger control is that of a foreclosure of actual or potential competitors. A merger may result in foreclosure when actual or potential competitors' access to inputs or markets is hampered or eliminated as a result of the merger, thereby reducing these companies' ability to compete. Ultimately, the result is that of the merged entity being able to exert market power following the merger. In the context of digital markets, competition authorities have investigated:

- whether and to what extent network effects play a role in determining the likelihood of a foreclosure. This is discussed in section I.4.2.1;
- whether mergers that lead to the combination of data may confer such an advantage to the merged entity so as to impede effective competition. This is analysed in section I.4.2.2.

I.4.2.1 Foreclosure with network effects and multi-homing

I.125. As discussed in section I.4.1.1, network effects often characterise digital markets. The market for PSN services analysed by the Commission in *Microsoft/LinkedIn*⁵³ is no exception. LinkedIn was the leader in the market for PSN services, whereas Microsoft held a strong position in the markets for OSs and productivity software for PCs. The Commission explored whether the merged entity could leverage its strong market position from the markets for OSs and productivity software for PCs to the market for PSN services, thereby reinforcing LinkedIn's competitive advantage in this market and foreclosing its competitors. The strategies that could be pursued by the merged entity were: the pre-installation of a LinkedIn application on Windows PCs; and the integration of LinkedIn features into Office, while at the same time denying the same levels of integration to competing providers of PSN services, for instance through denial of access to Microsoft Application Programming Interfaces (APIs).

I.126. Both strategies were considered technically feasible and capable of foreclosing competing providers of PSN services; also, the Commission noted that the merged entity was likely to have the incentive to engage in such strategies, as also suggested by Microsoft's internal documents which explicitly mentioned the opportunities related to implementing these strategies post-transaction. The Commission then went on to assess the overall likely impact on competition of these practices: this is where network effects come into play. According to the Commission, network effects:

- could make foreclosure of existing competing providers of PSN services more credible through the following mechanism: the more LinkedIn's user base would grow, the more additional users would be more willing to join the network and less willing to join instead competing PSN service providers. The Commission envisaged that this trend could have continued up to the point that the market would "tip" in LinkedIn's favour;
- could represent barriers to entry for potential competitors, thereby exacerbating the anticompetitive potential of these foreclosing practices. Indeed, the Commission considered that potential entry of new PSN service providers could have, in principle, mitigated the impact of network effects, but concluded that this was not the case. Indeed, even though launching a new PSN service might not entail significant difficulties, the market investigation supported the view that having to achieve a sizeable user base might represent a high, sometimes unsurmountable, barrier to entry.

I.127. Another factor taken into account by the Commission for its potential to mitigate network effects was multi-homing; yet, in this case, it was considered insufficient. Indeed, multi-homing is likely to be more limited in PSN services as compared to consumer communications services: actively

⁵³ See section 4.2.3 of *Microsoft/LinkedIn*.

engaging on PSN platforms requires time and effort as users need to create their profile and keep it updated, build their network and interact with new contacts. The Commission found through its market investigation that, pre-merger, although many users did have accounts on multiple PSNs, they actively used only one of them or, at least, they viewed one of them as their “main network”; that is, for what concerns competition, they were single-homing as discussed in annex A.1.2. This is because here network effects result from consumers *using* the service. Furthermore, the merger might even make multi-homing decrease for its potential to strengthen LinkedIn’s market position and the subsequent reduced incentive for users to invest the effort associated with actively using competing PSNs.

I.128. As regards the ultimate impact of these strategies on consumers, the Commission noted that if these strategies were to succeed and marginalise existing competitors offering better privacy protection than LinkedIn, the transaction would have restricted consumer choice with respect to this important non-price parameters of competition. Through its market investigation, the Commission had found that privacy protection was indeed considered by users an important parameter of competition and driver of customer choice in the market for PSN services. Moreover, the Commission noted that there existed competitors offering better privacy terms than LinkedIn. For instance, in Germany and Austria, XING offered a greater degree of privacy protection than LinkedIn. During the registration process, XING asked users to actively accept XING's privacy policy and Terms & Conditions by ticking a box, whereas in LinkedIn this acceptance was automatic as users pressed the button "join now". Also, when XING introduced new services which had an implication on how it collected and/or used its members' data, it explicitly required active consent from the members, without making their ability to continue using the platform as it was subordinated to this consent. In contrast, when LinkedIn made changes to its collection, storing, processing or usage of personal data, it only informed the members of those changes and assumed that they agreed with those changes if they continued to use LinkedIn's services after they had been notified of the changes.

I.129. The Commission concluded that these practices, namely the pre-installation of a LinkedIn application on Windows PCs, and the integration of LinkedIn features into Office and denial of access to Microsoft APIs, were likely to foreclose LinkedIn’s competitors and have a negative impact on competition. In order to remove these concerns arising from the transaction, the merging parties submitted two sets of commitments.⁵⁴ One set of commitments was meant to address the concerns related to the possible pre-installation of a LinkedIn application on Windows PCs; another set of commitments aimed at removing the concerns related to the possible integration of LinkedIn features into Office and denial of access to Microsoft APIs. The initial commitments proposed by the merging parties were revised to take into account the concerns emerging from the market test conducted by the Commission. The main obligations contained in the final version of the commitments included:

- granting access to all Office APIs and the associated Office Add-In Programs⁵⁵ to third parties which designed, operated and offered PSN services;
- allowing PC OEMs and distributors⁵⁶ not to install the LinkedIn application for Windows PCs, in the case such an application was actually built post-transaction, and not retaliating PC OEMs promoting Windows PC applications for third-party PSN Service Providers;

⁵⁴ See section 5 of the Commission Decision of 6 December 2016 in Case M.8124 – Microsoft/LinkedIn.

⁵⁵ The Initial Commitments proposed by the parties limited the obligation to grant access to the Outlook APIs and the Outlook Add-In Program.

⁵⁶ In the Initial Commitments, these obligations were limited to OEMs; the revision extended them to any OEMs’ distribution partner who had the right to determine which applications are installed on the PCs manufactured by that OEM.

- granting users the ability to disable and re-enable the “LinkedIn Features for Office”⁵⁷ and to remove the LinkedIn Windows PC application from their Windows PC OS.

I.130. The duration of these commitments was five years. The Commission considered that the Final Commitments were sufficient to eliminate the serious doubts as to the compatibility of the transaction with the internal market.

I.131. In *Microsoft/Skype*,⁵⁸ the Commission investigated a foreclosure ToH similar to that discussed in *Microsoft/LinkedIn*. It assessed whether post-merger Microsoft could have profitably tied Skype with other Microsoft products, leveraging its strong market position in the market for OSs and in that for productivity software, foreclosing alternative providers of communication software. As reported in section I.4.1.1, the Commission noted that the data submitted by the merging parties revealed a significant degree of multi-homing by users. The tendency of users to multi-home limited the benefits that tying would have delivered, as there was evidence that consumers did not simply use whatever communication service was provided with Windows and pre-installation did not prevent alternative providers of communication software from attracting them.

I.132. In *SeLoger/Logic-Immo*,⁵⁹ the French NCA also investigated the possibility that foreclosure of competing online property ads portals could follow the transaction as a result of the implementation of bundled schemes by the merged entity. Although the exact form that this bundling would have taken was unknown, the French NCA envisaged that such bundled schemes would have likely allowed estate agencies to simultaneously publish their ads on both SeLoger and Logic-Immo at a lower price than the sum of the prices to publish on the two platforms separately. After having concluded that the merged entity had the ability and incentive to pursue this potentially foreclosing strategy, as also suggested by the fact that the parties submitted that they had indeed plans to offer such schemes, the French NCA examined the likely impact on competition of these bundling strategies. It noted that cross-side feedback effects could, in principle, contribute to foreclose the parties’ rivals, generating a spiralling negative effect: a fall in the number of ads published on competing portals, likely to result from the bundled schemes, could generate a fall in audience, which could, in turn, exacerbate the fall in the number of ads by reducing the attractiveness of the portals to advertisers. The French NCA considered that these spiralling negative effects could reinforce the position of the main portals and deteriorate that of the smallest players, generating concentration of the audience in a few portals. Yet, an examination of the characteristics and trends in the online property ads market did not support the view that bundled schemes and cross-network effects could have generated such a spiralling negative effect.

I.133. In particular, the French NCA noted that, as discussed in section I.4.1.1, a fall in the number of ads did not always lead to a significant fall in audience; and that differentiation among online property ad portals implied that portals with fewer ads could still better respond to some specific users’ preferences. In addition, the French NCA noted that past market trends did not point to the existence of such a spiralling phenomenon. Indeed, it was observed that the leading portal, namely Le Bon Coin, had increased its position relative to competing portals without competing portals necessarily losing audience in absolute terms. In any event, the French NCA noted that Le Bon Coin would have continued to exert sufficient competitive pressure on the merged entity.

I.134. In *Google/DoubleClick*, the Commission investigated the existence of both direct and indirect network effects in, respectively, the ad intermediation and the ad serving technologies markets involved in the transaction. Direct network effects in the ad serving market imply that DoubleClick

⁵⁷ The “LinkedIn Features for Office” refer to any new functionality included in Office that involves LinkedIn profile and activity information being displayed in Office and be accessible to Users in Office.

⁵⁸ See section 3 of *Microsoft/Skype*.

⁵⁹ See section III.A.4 of *SeLoger/Logic-Immo*.

would become more attractive to advertisers (publishers) because it already served many other advertisers (publishers). Indirect, or cross-side, network effects instead imply that the ad network would become more attractive to advertisers as the number of publisher increased, and *vice versa*; ad networks, indeed, are two-sided platforms connecting sellers and buyers of advertising space, similar to those discussed in *SeLoger/Logic-Immo*.

I.135. Direct network effects came into play in the assessment of foreclosure strategies based on DoubleClick's position in the ad serving market. DoubleClick had a wide customer base on both sides of the market which translated into the collection of a large amount of information about internet users' surfing behaviour. This information *as a whole* would be valuable for advertisers as it would allow to better target advertisements; also, it would be valuable for publishers since better targeted ads would entail a better performance of ads on their websites which could be translated into higher prices for the ad space they sold. First, the Commission noted that DoubleClick was contractually allowed to use the data generated by an ad it served only to improve its services to the advertisers whose ad was served when the data in question was first recorded; the same was true for the publisher side. Second, the Commission noted that the type of behavioural targeting that was at the core of these network effects was, at the time of the merger, an emerging technology that neither Google nor DoubleClick had developed. Therefore, it was concluded that in this competitive environment the ad serving tools market was not characterised by direct network effects.

I.136. As regards indirect network effects, it was investigated whether they could increase the merged entity's incentives to engage in different types of foreclosing strategies. While the presence of these cross-side network effects was not questioned, their strength was examined. The relevant question was, indeed, whether the network effects were strong enough to make the ad intermediation market "tip" in the merged entity's favour. The Commission observed that its market investigation provided evidence that the ad intermediation market was characterised by significant entry and competition and that ad networks were able to compete even with a small number of publishers participating in the network. Also, the available evidence suggested that customers tended to multi-home: both publishers and advertisers, especially medium and large companies, typically used more than one intermediation platform at the same time. Indeed, both have an incentive to do so: publishers wish to maximise the probability of selling their whole inventory, advertisers wish to buy the desired ad space at the best conditions possible. The data provided by the parties indicated that more than half of DoubleClick's customers used at least two ad networks, and some of them more than five. Multi-homing was facilitated by the low or non-existent cost of joining an ad network; and by the high degree of interoperability characterizing the ad serving tools.⁶⁰ For these reasons, indirect network effects were considered unlikely to induce the market tipping and this represented an important argument for the dismissal of the foreclosure ToHs considered by the Commission.

1.4.2.2 Big data as an essential input to compete

I.137. In traditional merger control, foreclosure ToHs are formulated when the transaction combines products that are complementary with each other and, as a result of the transaction, the merging parties' rivals are refused access to an important input. As discussed in section I.2.4 and in Annex A.4, data represents an increasingly important asset for firms operating in digital markets. This section discusses how, in these markets, foreclosure can result from the combination of two previously independent datasets. The data a firm owns can, indeed, enter its productive process in several ways and, based on how this occurs, the creation of a larger or more diverse dataset resulting from a merger

⁶⁰ The Commission observed, indeed, that there were no major problems of intercommunication between an advertiser using a provider of "advertising ad serving tools" and a publisher using a different provider of "publisher ad serving tools" or its own in-house technology. See section I.2.1 and Annex A.1.3 for a discussion of the role of network interoperability in restoring competition in markets characterised by network effects.

may give the merged entity a competitive advantage. However, this potentially negative effect on competition does not result from the mere exertion of market power: rather, it is the result of efficiencies realized by the merging parties that place it ahead of its competitors. In a sense, the restriction to competition comes from the merged entity becoming better at what it does and providing more value to its customers.

I.138. This possibility was the main competitive concern raised in relation to the *Apple/Shazam* transaction.⁶¹ Apple and Shazam were active in the digital music industry, albeit with different roles. Other than designing, manufacturing and selling mobile devices and personal computers, and developing the operating systems installed on these devices, Apple operated Apple Music, one of the leading music streaming platforms. Shazam offered a leading music recognition app for mobile devices and personal computers and was also active in the online advertising market. One of the channels through which it generated revenues was the licensing of music data and analytics services.

I.139. The Commission investigated two main ways in which data combination could lead to diminished competition. First, the Commission explored whether the transaction would give Apple access to commercially sensitive information about competing music streaming platforms, in particular Spotify,⁶² that could put them at a competitive disadvantage in the market for digital music streaming apps and lead to their foreclosure. Indeed, data collected by Shazam included:

- information regarding the user's identity. This information varied depending on whether the individual user decided to register or opted to be anonymous. In particular, it could consist in an email address or Facebook identifier for registered users, and in an advertising identifier generated for anonymous users;
- information about the presence of non-pre-installed digital music streaming apps on the mobile devices where Shazam is installed;
- some additional pieces of information for those users who have connected their Shazam account with their Spotify account, including the user's display name, information about the user's followers, the user's Spotify identifier, as well as (subject to the user's consent) the user's birthdate, country, email address, account type (freemium or premium), top artists and tracks, and currently playing track.

I.140. Shazam's customer information was considered commercially sensitive as it could help Apple improve the effectiveness of its customer acquisitions strategies by targeting its rivals' customers through advertising or marketing campaigns. The Commission went on to assess whether Apple would have the ability and incentive to use this information to pursue such a strategy and what the overall impact of the strategy on competition would have been:

- as regards the ability, the Commission considered that, while from a purely technical point of view this strategy would have been feasible for Apple, there might exist legal or contractual limitations to the use of Shazam's customer information post-transaction. Shazam was able to access data about which apps were installed on a user's Android device because the Android Developer Guidelines allowed it, but this could change at any point in time and was beyond Apple's control.
- regarding the incentive, the Commission noted that Apple's submissions and internal documents stressed that marketing efforts target new subscribers rather than switchers. Moreover, Apple submitted that it planned to change Shazam's data collection practices to bring them in line with Apple's policy: this would have entailed that Shazam would no longer collect information on other apps installed on the user's mobile device unless this was consented to by the app developer.

⁶¹ See section 8.4.2 of *Apple/Shazam*.

⁶² Spotify was, indeed, the market leader in the European Economic Area (EEA), while Apple Music had rapidly become the second largest provider of music streaming services in the EEA since its launch in 2015.

- in any case, the Commission concluded that the overall impact of these practices on competition would have likely been limited. Indeed, it noted that the same customer information would have been available to many other players post-transaction; Facebook and Twitter, for instance, collected information on their users' interests. Apple could have relied upon alternative providers to pursue these targeting strategies also before the transaction. In other words, the customer information in question was not unique to Shazam and it was not considered such that it could materially increase Apple's ability to target music enthusiasts.

I.141. Further, the Commission considered whether the data collected by Shazam could have been used to improve existing functionalities, or to offer additional functionalities, on digital music streaming apps, thereby qualifying as an important input with respect to the provision of digital music streaming services. For instance, one such improvement could have been offering better targeted music suggestions to users. If this was the case, denying access to these data to competing providers of digital music streaming services could have significantly impeded competition in this market generating an exclusionary effect. While the Commission considered that the merged entity was likely to have the ability and incentive to use Shazam's data for similar purposes, it also noted that these strategies were unlikely to result in the foreclosure of Apple Music's competitors, and, more generally, to have a significant negative impact on competition. This conclusion was reached based on evidence from the Commission's market investigation which suggested that the type of data collected by music recognition apps did not appear to be an important input. The Commission compared Shazam's data to other available datasets on users of digital music services based on the so-called "four V's":⁶³ the variety of data composing the dataset; the speed at which the data are collected (velocity); the size of the data set (volume); and the economic relevance (value); and it concluded that Shazam's data was not more comprehensive than other datasets available in the market, it was generated at a lower speed and with lower per user engagement, and had never been considered a strategic asset by the merging parties. In conclusion, even if the merged entity were to deny Apple Music's rivals access to Shazam's data, the impact on their ability to compete would have likely been minimal.

I.142. The possibility that a combination of datasets held by merging parties gives them a competitive advantage that may diminish competition was also investigated by the Commission in its *Facebook/WhatsApp* decision⁶⁴. At the time of the merger, Facebook collected user data, although it did neither sell them nor provide data analytics services in any market as a stand-alone product separate from the advertising space itself.⁶⁵ Yet, the data it collected was extremely valuable since it could be used to make advertisements as "targeted" as possible for each user, which increases the effectiveness of the ads and, therefore, attractiveness of the advertising space sold by Facebook. The possibility to infer the individuals' interests, indeed, allows advertisers to concentrate their marketing efforts towards users that revealed certain preferences or needs, and that are supposed to be the most receptive audience for the products or services they are promoting.⁶⁶

⁶³ These are four relevant big data metrics as suggested in "Competition Law and Data", 10 May 2016, a joint report of the Bundeskartellamt the German National Competition Authority ("NCA") and the French Autorité de la Concurrence, available at <http://www.autoritedelaconcurrence.fr/doc/reportcompetitionlawanddatafinal.pdf>.

⁶⁴ See section 5.3.3 of *Facebook/WhatsApp*.

⁶⁵ Facebook made available certain non-personally identifiable data (aggregate or anonymous data) to advertisers to help measure the effectiveness of their ads. For example, Facebook shared basic ad performance information with advertisers, such as the number of people who saw or clicked on their ads, the cost of those ad placements, and the number of people who "converted," for example, by visiting the advertiser's website after viewing an ad on Facebook.

⁶⁶ Online advertising based on "behavioural targeting", in particular, is a form of advertising whereby online ads are served to specific users based on (comprehensive) profiles of the users generated by observing their web surfing habits. Traditionally, search targeting was considered more effective than non-search targeting, as the former is based on self-revealed interests (via the search query) and the latter was derived by an indirect and usually less precise inference of the consumer's interests.

I.143. The Commission explored whether post-merger Facebook could have started collecting data from WhatsApp that could have enabled it to better target advertising for those WhatsApp users that were also Facebook users, thereby making Facebook more attractive to its advertising customers and foreclosing other providers of online advertising space. However, the Commission noted that before the transaction WhatsApp was not collecting user data that could be valuable for advertising purposes (for example, information concerning age, verified name, gender, social group, activities, consuming habits or other characteristics); the only data WhatsApp was storing about its users were their user name, picture, status message, phone number and the phone numbers in their phone book. Yet, it could have started collecting additional valuable data including age, gender, country, and message content. The Commission considered that such a strategy would have required WhatsApp to change its privacy policies, with potentially negative reactions by some users that could limit the economic incentive for the merged entity to pursue it. In particular, the Commission envisaged that users who valued privacy protection might have decided to switch to other messaging application they perceived as less intrusive.⁶⁷ In other words, the potential perception by users of their personal data as a price was considered as a driver of competition. Moreover, the Commission noted that most respondents to its market investigation pointed out that, post-transaction, there would remain a sufficient number of alternative providers of advertising services competing with Facebook. The ToH was thus dismissed.

I.144. The *Google/DoubleClick* merger⁶⁸ also had the potential to produce a similar effect, i.e. that of making the merging parties more attractive to advertisers through the combination of diverse datasets. More specifically, the merger would have combined the search information collected by Google and the browsing information collected by DoubleClick. In dismissing this ToH, it was crucial to note that some clauses in DoubleClick's contracts with advertisers prevented DoubleClick, and hence the merged entity, from using data about users' web surfing behaviour generated by their ads to better target ads from other advertisers and, mostly, that the combination of data about searches and data about users' web surfing behaviour was already available to some of Google's integrated competitors, notably Yahoo! and Microsoft.

I.145. In *Microsoft/LinkedIn*⁶⁹ the Commission assessed whether data combination could strengthen the merged entity's position in the market for online advertising. Data available to the parties included email or other contact information, users' personal information such as information about an individual's job, career history and professional connections and search behaviour information that could be used for advertising purposes and thus sold to advertisers. The Commission considered that the combination under the same ownership of two previously independent datasets could have increased the merged entity's market power in a hypothetical market for the supply of this data or increased barriers to entry/expansion in the market for online advertising or simply removed the pre-merger competitive constraint the parties were exerting on each other in the market for online advertising based on the data they controlled. This ToH was dismissed mainly based on the evidence that after the transaction there would have still existed a large amount of data valuable for advertising purposes that was not in the merged entity's exclusive control so that it was unlikely to raise barriers to entry/expansion in this market.

Non-search advertising was mainly used to create brand awareness. The development of increasingly sophisticated behavioural targeting technologies has been closing the gap between the two in terms of effectiveness.

⁶⁷ After the announcement of WhatsApp's acquisition by Facebook and because of privacy concerns, thousands of users downloaded different messaging platforms, in particular Telegram which offers increased privacy protection.

⁶⁸ See section 7.3.3 of *Google/DoubleClick*.

⁶⁹ See section 4.1 of *Microsoft/LinkedIn*.

I.146. A similar assessment with respect to online advertising was conducted by the Commission in *Verizon/Yahoo*⁷⁰. The transaction gave rise to several horizontal overlaps, among which that in the provision of online advertising services.⁷¹ The activities of the merging parties' users generated somewhat similar data that is valuable for advertising purposes. The Commission investigated whether data combination could result in a restriction to competition. Factors considered to dismiss this ToH included the existence of a large amount of Internet user data available to the parties' competitors after the transaction and evidence emerging from the Commission's market investigation which suggested that the data collected by the parties could not be characterized as unique. One customer, in particular, noted that it expected the increased data capability resulting from the transaction would enable the merged entity to improve its competitiveness against existing stronger competitors.

I.147. The cases discussed above mainly concern combination of data regarding consumers, making merging parties more attractive for advertisers. In other cases, data is valuable for firms as it may increase their attractiveness to final consumers, to the extent that owning richer datasets enables them to offer better services/products. This is the case, for instance, of search engines: as explained in sections I.2.1 and I.2.4, data constitutes a key input to train the algorithms necessary to produce an accurate engine, and the more data is used the more accurate search results are. This learning by doing generates "network-like effects" which contribute to making barriers to entry in this market quite high. An important player in this sector such as Microsoft acknowledged that a new entrant would have to bear significant costs related to the necessity of having a large dataset.⁷² However, it is also agreed upon that the value of data decreases with scale, i.e. that data has decreasing returns.⁷³ It is therefore critical to establish what amount of data is enough to credibly compete in the market for the supply of search engines and, as a result, in the market for search advertising. Indeed, search engines are two-sided platforms which connect users and advertisers: they compete to attract users to whom they offer their services for free, and advertisers who pay for their ads to achieve a large audience. For the reasons just outlined, ToHs related to data combination were investigated by the EC in *Microsoft/Yahoo! Search Business*, which was the first merger decision involving two major search engines. The transaction involved the merging parties' Internet search platforms and their search advertising services. The concern was that, following the merger, the costs that existing or potential competitors would have to bear to represent a credible competitive constraint would be even higher, with subsequent unilateral effects in the online advertising market, i.e. higher prices charged to advertisers. However, the Commission concluded that the larger scale achieved thanks to the merger would have allowed the merged entity to represent a more credible competitor to Google and this would have not been possible in the absence of the merger.

⁷⁰ See section 5.1 of *Verizon/Yahoo*.

⁷¹ Other areas of overlapping included the provision of general search services, consumer communication and email services, and digital content of different types.

⁷² See paragraph 111 of *Microsoft/Yahoo! Search Business*.

⁷³ For contributions on this topic, see section I.2.4 and Annex A.4.

I.5. GENERAL LESSONS FOR THE ASSESSMENT OF MERGERS IN DIGITAL MARKETS

I.148. There is a concern that merger policy has put too much weight on the risk of incorrect intervention (type I error) compared to incorrect clearance (type II error) when assessing mergers in the digital sector, leading to increased concentration in digital markets.

I.149. The nature of competition in many digital markets may change the terms of the usual trade-off between type I and type II errors. Network effects often make the structure of digital markets quite concentrated and barriers to entry rather high. Big data may contribute to such outcomes, to the extent that the data endowments enjoyed by incumbents provide a competitive advantage that makes it even more difficult to challenge them. The main mechanism left to discipline incumbents is that of competition *for* the market, i.e. that potential and actual entry mitigate the ability of incumbents to exert market power. This makes potential competitors even more valuable than they usually are in traditional markets. As a result, type II errors may be particularly costly. In other words, certain features of digital markets may justify some changes in the way mergers in the sector are typically assessed.

I.150. The economic literature (see section I.2.3 and Annex A.3.1 in particular) suggests that incumbents may have stronger incentives than, for instance, venture capitalists, to acquire entrants in the process of developing a competing product. Our review of past transactions carried out by Amazon, Facebook and Google has confirmed that incumbents of digital markets employ significant resources to acquire a large number of firms; that such firms are often very young (four-year-old or younger in nearly 60% of cases); and that they are often complementary to the business model of the acquirer.

I.151. Mergers may prevent the development of competitors in two main ways:

- directly, when the incumbent of a digital market acquires an entity that is an actual or potential competitor;
- indirectly, when the incumbent acquires an entity that supplies a complementary product/service, thereby depriving its direct (actual or potential) competitors of the opportunity to improve their products and better challenge the incumbent.

I.152. To assess whether a merger will be detrimental to competition, CAs would need to predict the evolution of the target in the absence of the merger, i.e. the counterfactual. This is especially challenging when, as is often the case, targets are young firms at the early stage of their development. In markets as dynamic as digital markets, evolution may be the result of the target's independent decision to change its business model and/or investments made by venture capitalists and/or the decision of other entities in the industry to purchase the target and integrate it in their own operations. In other words, when defining the counterfactual to a merger, CAs may need to consider the ability of the target to develop, on its own or attracting outside resources, as well as the likelihood of an alternative buyer coming along. Similarly to what investors do, based on business plans and on the characteristics of the markets concerned by the transactions, CAs should seek to evaluate the prospects of the target.

I.153. Such an exercise is inherently complex. One way to deal with such complexity would be to improve the information set that CAs typically rely on when evaluating mergers. First, while very resource-intensive, it may be helpful in some instances to use dawn raids in the context of merger investigations, as this may uncover valuable evidence such as the future plans of the target and whether the incumbent perceived the target as a threat.⁷⁴ CAs typically rely on internal documents

⁷⁴ This would not be unprecedented. The European Commission carried out dawn raids at the premises of merging parties for the purpose of its decisions of 30 January 2008 in Case /M.4734 – *Ineos/Kerling* and of 19 October 2011 in Case M.6106

supplied by the parties in response to requests for information; such evidence may in some instances be biased by the obvious incentives of the merging parties to have the merger cleared. CAs face relevant information asymmetries compared to the merging parties and need a more reliable source of unbiased information.

I.154. Another source of information that can be used by CAs in this context is the value of the acquisition. The value of a company at a given time represents the present value of future profits; the maximum willingness to pay of the acquirer for the target includes this plus the incremental profits of both the acquirer and the target that are due to the merger, i.e. the additional profits realized by the merged entity thanks to the merger. The value of the transaction will lie somewhere in between the current value of the target and the maximum willingness to pay of the acquirer. While incremental profits may derive from both efficiencies and anti-competitive effects, money spent to acquire the target can provide an insight into the relevance of the transaction. Thus, when particularly high, the value of the transaction may justify a more in-depth analysis of the merger.

I.155. CAs may benefit from a better understanding of the key markets in the digital sector, such as those for online advertising, which may represent a possible blind spot of CAs. In some cases, CAs have pursued ToHs where, in the absence of significant horizontal overlap between the merging parties, these were found to compete with one another for consumer attention as a means to attract advertising revenue (this was the case, for instance, in *Microsoft/LinkedIn* and in *Facebook/WhatsApp*, described in section I.4.1.2). However, the way this assessment was carried out leaves some doubts: the market where the effect of the merger was assessed was a very broad one, comprising all or most providers of online advertising space; and a very fragmented one, with several suppliers active in it. Virtually, no merger would raise competitive concern in such a market.

I.156. Defining such a broad market conflicts with the perception that many firms in the digital sector would appear to be holding significant market power, either in advertising or in related businesses. For instance, Facebook would seem to be commanding higher advertising prices than other social networks (as shown in section II.2.2.3) and has been under intense scrutiny for the way it handles its users' data (which may be viewed as an expression of market power); Google appears to have no credible rivals in search and, as a result, in search advertising.

I.157. Moreover, recent academic contributions on the topic of online advertising have put into question key assumptions that have been used to assess mergers in digital markets. Multi-homing has been consistently regarded as a factor that mitigates the anticompetitive effects of mergers in markets characterized by the presence of network effects (as discussed in section I.4.1.1 and I.4.2.1). However, in the online advertising sector, when multi-homing is across the merging parties, this may mean that the subset of such multi-homing users becomes exclusive to, and a source of market power for, the merged entity as a result of the merger since that subset can only be reached through the merged entity (see section I.2.2 and Annex A.2 for a discussion). In this context, multi-homing should be a reason of concern rather than a mitigating factor.

I.158. This means that we are probably missing something about how online advertising markets work. The first step in such an assessment would be understanding how advertisers make their choices, i.e. what drives their decision to use one platform over another. To the extent that advertisers place value on certain characteristics of a platform, and inasmuch a merger affects these characteristics, it may be possible for the merged entity to exert market power post-merger. Based on insights from the economic literature, as will be explained in the assessment of the *Facebook/Instagram* decision in section II.2.1.3, we have tentatively identified three potential drivers of demand choices: user base's exclusivity, platform's size and ability to target ads. However, more research is needed on this crucial

– *Caterpillar/MWM* in 2011. More recently, the Hungarian Competition Authority was authorized to carry out a dawn raid for the purpose of its decision of 10 May 2018 in the *DIGI/Invitel* case.

point, and perhaps the best instrument would be that of a comprehensive market study into the digital advertising sector, where the CMA could use its investigatory powers to examine how these markets work.

I.159. Finally, the time frame of two years, which represents the default for the assessment of some future market developments, such as entry, within merger investigations in the UK, may be somewhat limiting and could be extended when dealing with mergers in digital markets. For instance, Snapchat, now a significant competitive force in the social network market (see section II.2.2 for more details) was founded in 2011, went through several changes in terms of functionalities supplied to users, and was still operating at a loss in 2018.⁷⁵ Even in the fast-moving digital landscape, becoming successful can take more time than two years.

I.160. Even after reinforcing the tools available to CAs, there will always be a certain degree of uncertainty as to the counterfactual chosen for the assessment of a merger. As described in section I.4.1.3 (and in Part II of this report), when CAs have evaluated potential competition ToHs in digital markets, they have been quite conservative in their evaluations, often dismissing the fact that the target was on a quite clear growth path and it was planning to adjust its business model in a way that would have put it even more in competition with the acquirer. This was usually in light of uncertainty in growth prospects and in the likelihood that the targets' plans would have come to fruition.

I.161. Future plans, no matter how carefully set out, are always subject to being unmade by unforeseen market events. This may mean that CAs would need to be willing to accept more uncertainty in their counterfactual. What we are proposing entails a departure from the current practice of CAs. Assessments to be carried out in the context of merger control would inherently become more speculative than has been the norm so far. On the contrary, the approach requires to be somewhat imaginative with the definition of the counterfactual. The counterfactual may require for instance to predict how companies will evolve their business model and how successful they will be; and whether an alternative, pro-competitive transaction will come along.

I.162. Such a change in approach entails some risks. Given its more speculative nature, it is possible that the counterfactual imagined by the CA will never come to pass, increasing the likelihood of over-enforcement, prohibiting mergers that would not have actually resulted in a restriction of competition. Another risk is that of merger control becoming less predictable in its outcomes, with consequences on firms' incentives to invest. It is paramount that CAs seek to minimize these risks: this can be accomplished by relying on a more comprehensive information set and by gaining a better understanding of the key markets in the digital sector, such as those for online advertising.

I.163. Another risk is that of CAs falling short of the burden of proof they are required to satisfy to block a merger, thereby having their decisions successfully challenged in court. However, for CAs to be more effective in the enforcement of merger policy, it may be necessary to test the boundaries of the legal tests and constraints that CAs face. The characteristics of digital markets, and the shape that competition takes within them, may justify a more risk-taking approach.

⁷⁵ <https://qz.com/1200008/snapchats-snap-q4-2017-earnings-in-charts/>

**PART II. CASE BY CASE REVIEW OF PAST MERGER DECISIONS
TAKEN BY UK AUTHORITIES**

II.1. INTRODUCTION AND METHODOLOGY FOR PART II

II.1. Part II of the report takes stock of the general lessons drawn in Part I to address the two remaining research questions:

- assess the UK cases and evaluate whether the decision that the Authorities have come to was reasonable, evaluating whether ToHs have been investigated correctly and whether any relevant ToH has been omitted from the Authorities' analysis (research question 2, or methodology assessment);
- evaluate market evolution following the mergers to ascertain whether the merger has led to a detrimental outcome (research question 3, or market outcome assessment).

II.2. The methodology assessment of UK cases involves evaluating whether the Authorities' decision to clear the merger was reasonable based on evidence that was, or would reasonably have been, available at the time. This assessment amounts to analysing two key questions:

- were the ToHs pursued by the Authorities addressed correctly?
- was there any other ToH, in addition to those considered by the Authorities, that it would have been reasonable to pursue?

II.3. In order to address these questions, we propose an approach that can be summarised in the following three steps:

- for each case, identify all the ToHs pursued by the Authorities and the key arguments underpinning them;
- discuss the key arguments underpinning the decision;
- analyse the completeness of the ToHs pursued.

II.4. The decision to clear or block a merger is based on a series of arguments used by CAs to foresee the likely consequences of the proposed transaction. Only a subset of these arguments is key to the analysis and the first step of the proposed approach consists in identifying these key arguments, namely those arguments that determined the type of decisions made by the CA so that if one of them proved wrong or invalid, the decision reached by the CA might have been inappropriate.

II.5. These key arguments may contain factual assertions and logical proposition. A factual assertion is the description of an observable phenomenon. In general, it involves no judgment as it consists in a pure observation of a market characteristic, such as the size of the market shares, the number of competitors, the amount of available production capacity, or the type of competition that prevails in a market. Hence, assessing their validity means verifying whether each one was true or false at the time when the decision was taken, and whether its status has changed since then. However, there are cases in which these characteristics cannot be quantified or described in an uncontroversial manner.

II.6. A logical proposition, instead, consists in a reasoning that on the basis of a set of premises, which consists of factual assertions, derives a conclusion. There are two notions of validity that apply to a logical proposition. One refers to the internal consistency of the reasoning: a logical proposition is valid if, when the premises are true, the conclusions are also true. If the conclusions do not logically follow from the premises then the proposition is inconsistent and cannot be relied upon. It is important to verify the internal consistency of each key logical proposition on which a decision is based. The second notion of validity concerns the economic theory that underpins the reasoning: a logical proposition is valid if the conclusion is related to the premises by a valid economic theory.

II.7. It is worth highlighting that the validity of a proposition does not necessarily correspond with its truthfulness. Indeed, if one or more factual assertions are false, then the logical proposition based on

these premises will be false as well. However, it may still be valid if it is internally consistent and relies on a valid economic theory.

II.8. The second step of the proposed approach amounts to verifying the truthfulness of the factual assertions, and the validity of the logical propositions contained in the key arguments. For instance, the Authorities may have relied on questionable assumptions when estimating a certain phenomenon or effect; or may have wrongly interpreted evidence, thereby coming to a questionable conclusion.

II.9. Finally, the third step entails assessing whether the Authorities have exhaustively addressed all the meaningful ways the merger could have affected competition. The evidence collected in Part I is particularly helpful in this respect, providing indications on the possible ways that a merger can restrict competition in digital markets, some of which might have been overlooked by the Authorities.

II.10. While the Authorities carried out detailed analyses aimed at ascertaining the possible effects of the various mergers, in the methodology assessment we only report the key arguments behind the decision. Further, we chose to focus mostly on the gaps in the Authorities' analysis, since highlighting these may represent the best way to contribute to the current debate on how to shape competition enforcement in the digital sector.

II.11. The market outcome assessment of a merger case generally aims at understanding whether the decision to clear the merger has harmed consumers, compared to an alternative decision. When the decision is to clear the merger, the market outcome assessment entails the comparison of the market development that followed the merger with the one that would have realized had the merger been prohibited: this is the so-called counterfactual scenario. The standard evaluation techniques estimate the counterfactual by relying on the comparison of the relevant market outcomes before and after the merger and/or across treated and control group of firms (or markets). The effect of the merger is identified as the difference between the factual and counterfactual scenarios.

II.12. The standard evaluation techniques outlined above cannot be used for the evaluation of the UK cases for a number of reasons. Potential competition was often the main ToH analysed by the Authorities: the identification of the counterfactual would thus require estimating what would have been the evolution of the target had the merger not realized. As a result, the pre-merger situation cannot be relied upon to get a sense of the situation that would have arisen had the merger been prohibited. Moreover, these mergers were typically global in terms of their geographic scope: this means that there is virtually no geographic market that was unaffected by the merger and that can be used to estimate the counterfactual.

II.13. Thus, we evaluate how the markets affected by the mergers have evolved since the merger and rely on qualitative evidence to investigate whether, and to what extent, the merger determined the outcome observed. For each case, we identify the relevant competitive parameters to assess market outcomes and assess their evolution since the merger date. Qualitative evidence coming from industry reports and interviews with merging and third parties are used to appropriately interpret and corroborate the quantitative analyses.

II.14. Wherever possible, the market outcome assessment identifies the most appropriate metrics to evaluate market structure and performance, thereby providing guidance to future empirical assessments in similar markets.

II.15. The remainder of Part II includes the methodology and market outcome assessment for the five UK cases included in the review, i.e.:

- *Facebook/Instagram*,⁷⁶ analysed in section II.2;

⁷⁶ OFT decision of 14 August 2012 on ME/5525/12 – Facebook/Instagram.

- *Google/Waze*,⁷⁷ analysed in section II.3;
- *Priceline/Kayak*⁷⁸ and *Expedia/Trivago*,⁷⁹ analysed jointly in section II.4;
- *Amazon/The Book Depository*,⁸⁰ analysed in section II.5.

II.16. For each merger, the methodology and market outcome assessment are preceded by an overview of the case summarising the main elements of the transaction that emerged from the OFT's decision, including the merging parties' activities at the time of the merger and an anticipation of the potential competitive concerns arising from the transaction.

II.17. Section II.6 concludes by highlighting common themes arising from the case by case review.

⁷⁷ OFT decision of 11 November 2013 on ME/6167/13 – Google/Waze.

⁷⁸ OFT decision of 9 May 2013 on ME/5882-12 – Priceline/Kayak.

⁷⁹ OFT decision of 4 March 2013 on ME/5894/13 – Expedia/Trivago.

⁸⁰ OFT decision of 26 October 2011 on ME/5085/11 – Amazon/The Book Depository.

II.2. FACEBOOK/INSTAGRAM

II.18. The merger between Facebook and Instagram was cleared by the OFT on 14 August 2012. At that time, Instagram provided a free mobile photo app allowing users to take, modify and share photos on Instagram itself or on other social networks, making Instagram also an input to social networks; whereas Facebook was a digital platform supplying social networking services and had recently launched a mobile photo app, Facebook Camera.

II.19. After having noted that social networks are two-sided businesses competing to attract users and advertisers, the Authorities considered that Facebook was active in the provision of three relevant services: a social networking platform and a photo app to users, and advertising space to advertisers. However, the OFT did not find it necessary to reach a conclusion on the exact boundaries of the relevant product markets.

II.20. The Authorities investigated whether a competitive harm could arise from the transaction given the parties' actual overlap in the supply of photo apps and the potential overlap in the supply of social networking services. However, given that the relationship between photo apps and social network was considered to be to some extent complementary, the OFT also investigated vertical ToHs.

II.21. The OFT cleared the merger asserting that there was no competitive concern arising in any of the markets that the merging parties were active in.

II.2.1. Methodology assessment

II.2.1.1 Identification of ToHs pursued by the Authorities and of key elements underpinning them

Actual competition in the supply of photo apps

II.22. The merger would make the competitive constraint that the parties exerted on each other in the market for the supply of photo apps disappear, possibly resulting in unilateral effects post-merger. This ToH was dismissed based on the following pieces of evidence:

- the existence of several relatively stronger competitors that constrained Instagram more than Facebook's recently launched photo app;
- the limited attractiveness of photo apps to advertisers.

II.23. In particular, the relative strength of the other competing providers of photo apps was assessed by looking at the number of downloads for these apps relative to Facebook's. Specifically, the Authorities noted that, according to data provided by the parties, Camera Awesome and Hipstamatic had been downloaded over three times more than Facebook's camera app; Camera+ had been downloaded over six times more than Facebook's camera app; and Instagram had been downloaded over 45 more times than Facebook Camera. Also, third parties' submissions pointed to other photo apps as the closest competitors to Instagram. On the other side of the market, competition between Instagram and Facebook's photo app was only potential since at the time of the merger Instagram was not competing for advertising revenue. The Authorities, based on some third parties' submissions, noted that photo apps were not attractive to advertisers on a stand-alone basis; rather they were complementary to social networks. This was because, according to the Authorities, users did not spend a significant amount of time in the app and therefore eyeballs were not on the app for a significant amount of time and limited user data was captured.⁸¹

⁸¹ For instance, one of Facebook's advertising customers that was interviewed by the OFT during its investigation, submitted that Instagram did not provide significant marketing opportunities since it had no inherent advertising capabilities, as it was centred around taking and uploading pictures and users did not spend a significant amount of time in the app.

Potential competition in the supply of social networking services

II.24. Even though at the time of the merger Instagram was not competing with Facebook for advertising revenues and it had limited social network functionalities, the Authorities' concern was that this could change in the future. Indeed, Facebook was likely to be aware of Instagram's growing user base and it might have been concerned that if it increased its advertising prices, then Instagram would have the incentive to alter its offering to become a closer competitor in terms of functionality or display advertising inventory. Third parties agreed that it would not have been difficult or expensive for Instagram to expand its services to a website and to add some functionality similar to Facebook's. However, this ToH was dismissed because:

- the available evidence did not show that Instagram was particularly well placed to compete against Facebook in the short run; and
- there existed other firms that represented the main constraints on Facebook for brand advertising, namely Google, Yahoo! and Microsoft, as advised by the third parties interviewed by the Authorities.

Foreclosure of social networks competing with Facebook

II.25. The Authorities were concerned that the merged entity could (a) prevent Instagram users from uploading their photographs to rival social networks or (b) deteriorate the quality of the connection of the API between Instagram and those social networks, both with the intent of foreclosing Facebook's rivals in the market for the supply of social networking services. The Authorities noted that the merging parties were perceived by third parties to have the technical ability to implement these practices. However, this ToH was dismissed since the economic incentive to foreclose was likely missing: according to the Authorities, at least part of Instagram's appeal was attributable to the possibility to upload photos to other social networks, and such a practice could have caused some users to switch to other photo apps, making the practice unprofitable for the merged entity.

Foreclosure of competing mobile photo apps

II.26. The Authorities' considered that the parties would have had the technical ability to foreclose other mobile photo apps by reducing their ability to upload to Facebook. However, this ToH was dismissed because, according to the Authorities, Facebook had a strong incentive to allow its users to upload photos from as many sources as possible since this increased user engagement and the volume of user information. The foreclosing strategy, on the other hand, would have likely reduced customer engagement thereby making Facebook less attractive to advertisers. Also, the foreclosing effect would have been limited since users could have continued using competing photo apps to upload photos to other popular outlets.

II.2.1.2 Analysis of the key elements underpinning ToHs

Actual competition in the supply of photo apps

II.27. The Authorities argued that the merger would not lead to an SLC in the market for the supply of photo apps because:

- Instagram had closer competitors than Facebook Camera on the users' side of the market;
- photo apps in general, and Instagram in particular, were not attractive to advertisers.

II.28. The main piece of evidence evaluated by the Authorities to support the conclusion that Instagram and Facebook Camera were not particularly close competitors was the number of downloads of other competing photo apps relative to Facebook Camera. However, using the number of downloads to measure market shares is problematic as this metric does not reflect user engagement: since downloads are usually free and simple, consumers might decide to try more than

one photo app, but actively use only the one(s) that better responds to their needs. Actual usage data may have provided a better insight into closeness of competition. One common way to consider user engagement is to use the number of unique active users, i.e. those that have used the app at least once over a certain time span, or the time spent using the app.

II.29. On the advertising side of the market, photo apps were not considered by the Authorities to be *per se* attractive to advertisers since users spent a limited amount of time on them. To reach this conclusion, the Authorities relied on the opinion of third parties. For instance, one of Facebook's advertising customers believed that Instagram did not provide advertising opportunities. However, the opinions collected by the Authorities were not unanimous on this point:

- another of Facebook's advertising customers observed that Instagram offered potential advertising benefits thanks to its growing user base, pointing to a similarity to Facebook in the period in which it started out its business and was not selling advertising space. Social apps and websites do not always immediately present monetisation opportunities; rather, they develop such monetisation opportunities once they have reached a large and engaged enough user base for them to be attractive to advertisers;
- one of Facebook's competitors submitted that Instagram had already amassed a loyal user base spending considerable amounts of time on the app and its user base growth was unmatched by similar apps.

II.30. The importance of this issue and the diverging views of the stakeholders should have prompted the Authorities to collect data and test independently whether users did not spend a significant amount of time on Instagram. This could be false either because users did spend a significant amount of time in photo apps compared to social networks, including Instagram; or because Instagram was different from other photo apps.

II.31. The data available shows that Instagram did generate significant user engagement compared to other photo apps and to other social networks. In September 2012, on average, Instagram's users spent over three times more time on the app than Photobucket's users;⁸² and the total minutes spent on the Instagram app were thirty times larger than the minutes spent on Photobucket. Moreover, total minutes spent on Instagram by its users, as well the average minutes per user, were not dramatically different from the same figures for Twitter.⁸³ This indicates that Instagram might have been different from other photo apps in terms of the user attention received and, consequently, potential attractiveness to advertisers.

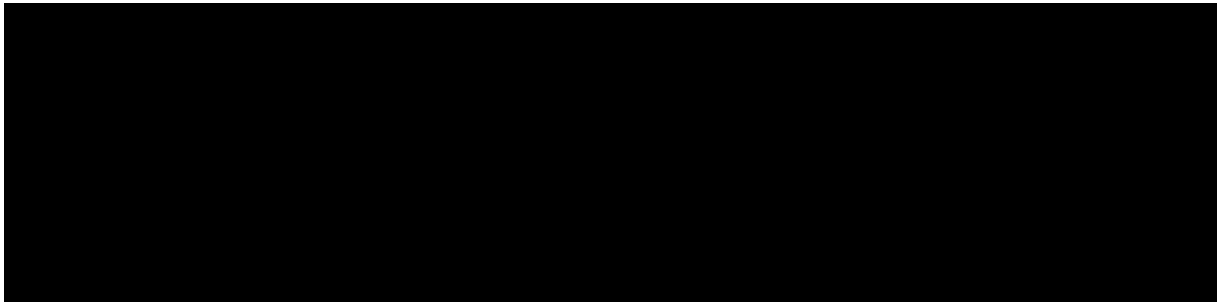
Potential competition in the supply of social networking services

II.32. The Authorities indicated that available evidence did not show that Instagram was particularly well placed to compete against Facebook in the supply of social network services. However, the evidence available to the Authorities would not seem to unambiguously support this conclusion. Such evidence includes:

⁸² Photobucket was chosen for this comparison since it was the only photo app for which it was possible to retrieve data and that already had a significant presence in the market at the time of the merger.

⁸³ In particular, ComScore data shows that Instagram's users spent 16.4 million minutes on the app and the average minutes spent on the app by each user were 6.54; Photobucket's users spent 0.54 million minutes on the app and the average minutes spent on the app by each user were 1.84; finally, Twitter's users spent 12.23 million minutes on the app and the average minutes spent on the app by each user were 8.03. The data collected from ComScore does not include the time spent by users under Wi-Fi connection: it thus underestimates the time spent on mobile devices. For this reason, time spent on mobile devices cannot be compared to time spent on desktop, limiting a meaningful comparison time spent on mobile devices only. Despite this limitation, these figures still provide an indication of Instagram's relative position. Photobucket was the only photo app for which these metrics were available that already represented a significant constraint on Instagram, as shown by data on registered and unique users provided by the parties at the time of the investigation.

- the submission of one of Facebook’s competitors arguing that it would have not been technically difficult or expensive for Instagram to expand its services to a website and to add functionalities similar to Facebook’s. The competitor’s view was that it was not the technology behind social networks that was unique, rather it was Facebook’s size, scale and social graph that were extremely hard to match. For this reason, the competitor stressed the importance of Instagram’s user base and social graph, and the rapidity with which they were achieved,⁸⁴ which made Instagram different from other photo apps. The view that Instagram’s most important feature was its engaged user base was shared by another of Facebook’s competitor in the supply of online advertising space;



II.33. On the advertisers’ side of the market, the Authorities failed to analyse the factors that drive the choices of the demand, and therefore how attractive Instagram could have been to advertisers as it was and as it was likely to develop. The advertisers’ side of the market, and the drivers of the advertisers’ choices, are discussed more thoroughly in section II.2.1.3.

Foreclosure of social networks competing with Facebook

II.34. The key argument for the dismissal of this ToH was that the incentive to engage in a foreclosing strategy was missing as Instagram’s popularity would likely be negatively affected. The hypothesis is that those Instagram users that were also, for instance, loyal Twitter users would then decide to switch to another photo app that allowed them to upload their photos from Instagram to their preferred social network.

II.35. This was based on the assumption that at least part of Instagram’s popularity was due to the possibility of uploading their photos to other social networks. [REDACTED]

[REDACTED] The Authorities might have sought to collect the same metrics for other social networks to test whether such an assumption was reasonable, and Instagram’s popularity actually hinged on users being able to interact with their preferred social network.

II.36. In addition, the validity of the Authorities’ argument heavily depends on Instagram’s popularity among photo apps. For instance, if Instagram was a must-have service then the loss to the merged entity would have been minimal. It might as well be the case that the assumption that users put an extra value on Instagram for the possibility of uploading photos to other social network was true at the time of the merger, but this was likely to change in the future had Instagram’s popularity increased. Indeed, the Authorities might have investigated:

- whether the merger itself was likely to make Instagram more popular to such an extent that the number of customers switching to competing photo apps would have been negligible: Facebook helping Instagram managing its growth was one of the declared rationales of the transaction;

⁸⁴ For instance, a competitor of the merged entity advised that the larger the company, the more advertisers believe that they must be on that company’s platform because they perceive that the return for their investment is more guaranteed.

⁸⁵ These features were mentioned in Instagram’s roadmap for future objectives that was included in an internal presentation.

- the likelihood of Instagram significantly growing and increasing its popularity among photo apps due to factors independent from the merger: this entails similar considerations to those made with reference to the potential competition in the supply of social networking services ToH.

II.37. In addition, incentives to foreclose were not carefully set out. Limiting Instagram’s interactions with social networks other than Facebook would likely have resulted in Instagram losing the users that were loyal to those social networks. However, Instagram was not monetising its users’ attention at the time and presented, according to the Authorities, limited opportunities for advertising. This means that users lost by Instagram as a result of the foreclosure would not have implied foregoing revenue, whereas any user gained by Facebook would have translated into advertising dollars.⁸⁶ As a result, incentives to engage in a foreclosure practice could have been higher than what was estimated by the Authorities.

Foreclosure of competing mobile photo apps

II.38. The key argument that the merging parties did not have the incentive to pursue a strategy aimed at foreclosing other photo apps rested on the assumption that this would have likely reduced engagement of Facebook’s users. This implicitly assumes that the losses for Facebook would have likely outweighed the benefits for Instagram making the strategy overall unprofitable for the merged entity. Again, an assessment of Instagram’s post-merger popularity could have been helpful to better understand the parties’ incentives. Indeed, had Instagram significantly improved its position in the market for the supply of photo apps, the volume of content uploaded to Facebook from rival photo apps would have been very low. In such a scenario, the losses Facebook would have incurred in terms of user engagement could have been negligible.

II.39. However, for the same reasons outlined above, the merged entity could only lose advertising revenue through this strategy. Indeed, any lost content on Facebook could have translated into monetary losses, whereas increasing Instagram’s popularity did not bring additional revenue since Instagram was not monetizing at the time. This reinforces the OFT’s conclusion that the merged entity lacked the incentive to pursue such a strategy, which appears overall reasonable.

II.2.1.3 Analysis of completeness of ToHs pursued

II.40. The Authorities placed significant attention on what the merging parties did, i.e. the particular function that their apps performed. However, even though the apps of the merging parties performed different functions (social networking services and photo apps), they were potential competitors as Facebook was clearly in the business of harvesting consumer attention and selling it to advertisers, in line with the economic literature on markets for attention discussed in section I.2.2 and in Annex A.2; and Instagram was a potential entrant in such a market. To some extent, the existence of unilateral effects may disregard the particular function performed by the apps to assess the extent to which they could have been substitutable from the perspective of advertisers, had Instagram started to monetize its services by selling advertising space.

II.41. The first step in such an assessment is understanding how advertisers make their choices, i.e. what drives their decision to use one platform over another, or to use both. To the extent that advertisers place value on certain characteristics of a platform, and inasmuch as a merger affects these characteristics, it may be possible for the merged entity to exert market power post-merger.

II.42. Three factors seem to play a particularly important role in making one provider of advertising space more or less attractive from the perspective of advertisers:

⁸⁶ Although, arguably, engagement on Instagram was likely of value to the merged entity inasmuch it revealed users’ preferences and allowed to improve the accuracy of targeted advertising.

- user base's exclusivity. If certain users can only be reached by advertisers on one platform as they spend most of their time on it, clearly that platform has more bargaining power over the advertisers interested in reaching those users. Prices for the platform's advertising spaces will thus increase with the number of users that are exclusive to the platform. More generally, the degree of exclusivity may also matter: users shared with only one other platform may be worth more than users shared with many other platforms;
- platform's size. Larger platforms are more attractive to advertisers for at least two reasons. First, they reduce the necessary transaction costs to reach a certain number of users, as these users could potentially be reached by contracting with just one instead of many providers of advertising space. Second, they remove the inefficiencies that might derive from placing ads on two or more independent platforms with potentially overlapping users: indeed, it might be the case that some users end up being inefficiently over reached. The importance of the platform's size is confirmed by third parties' submissions received by the OFT at the time of the merger investigation: for instance, one of Facebook's advertising customers considered Facebook as a must-have in its marketing strategy given its high volume of users and significant reach;
- ability to target ads. As explained in more detail in section I.4.2.2, information on users' behaviour collected by digital platforms provides insight into users' preferences and can be used to better target ads. The ability to target ads clearly depends on the quantity and quality of data generated by the platform, which in turn depend on the level of user engagement achieved by the platform.

II.43. In assessing the potential sources of competitive harm deriving from the *Facebook/Instagram* merger, the Authorities should have investigated whether the transaction could have affected one or more of the three factors outlined above. While an increase in the user base's exclusivity may exacerbate the merged entity's ability to exert market power, and could be hence considered as a straightforward source of competitive harm, the remaining two mechanisms should be considered as efficiencies. Yet, even in this case, the Authorities may have evaluated whether the transaction could have indirectly harmed competition, by depriving actual or potential competitors of the opportunity to improve their products and compete more effectively. This hinges on whether, in the absence of the transaction, the target would have been acquired by an alternative buyer. When a merger leads to the realization of efficiencies, the Authorities could indeed investigate whether, and to what extent, competition would instead benefit from having another entity realize those efficiencies. Given that efficiencies to be gained from mergers generally decrease with the scale and the number of acquisitions already carried out, the Authorities should carefully consider whether acquisitions are being carried out with a defensive purpose, i.e. to prevent entrants from gaining the efficiencies necessary to more effectively challenge incumbents.

II.44. If the transaction made some users, that were previously shared between the merging parties, exclusive to the merged entity, this could increase the merged entity's market power in the market for online advertising. This would have been dependent on the extent of usage overlap: intuitively, the likelihood that the merged entity's user base becomes more exclusive *as a result of the merger* increases as the portion of overlapping users increases.⁸⁷

This represents an imperfect measure of cross usage: first, it does not take into account users' engagement with the two platforms, which is what ultimately matters to advertisers, and second, it does not count those overlapping users which did not connect their accounts. Yet, it could have represented a preliminary indication that such an effect could arise. Furthermore, even if the overlapping users did not become exclusive of the merged entity as they

⁸⁷ In the extreme situation in which two merging parties have no user in common pre-transaction, the merger clearly would have no effect on user bases' exclusivity.

could still be reached through another platform, the transaction would lead to a reduction in the competitive constraints faced by the merged entity for those users.

II.45. If the transaction led to the creation of a larger platform, or increased the ability of the platform to target ads, this could increase the merged entity's attractiveness to advertisers and deprived competitors of a similar opportunity. As a preliminary step, the Authorities should have explored whether some form of integration between Facebook and Instagram infrastructure was possible to give advertisers the opportunity to design joint ad campaigns reaching the users of both platforms. If this was technically feasible, the Authorities should have assessed whether Instagram's user base represented an increment to the platform's size that was valuable for advertisers. In this respect, collecting data on demographics characteristics of Facebook's and Instagram's users could have revealed whether the transaction allowed the merged entity to reach a more comprehensive audience than Facebook and Instagram did by themselves.

II.46. Finally, the Authorities did not explore ToHs related to data combination. The merging parties could have combined their arguably considerable data endowments, enriching their social graph of users. In line with the economic literature reviewed in section I.2.4 and in Annex A.4 and with the ToHs explored by other CAs described in section I.4.2.2, the Authorities could have assessed whether data combination could have resulted in the merged entity gaining a significant competitive advantage that could have led to foreclosure of alternative suppliers. With respect to this, the Authorities could have investigated whether the merging parties had the technical ability to implement such data combination, their incentives to pursue such a strategy and the overall impact on competition. Both depended on the extent to which combining the datasets would have increased the merged entity's ability to target ads, making it more attractive to online advertisers. In this assessment, the Authorities should have considered also that if targeted advertising generally benefits from enriching the platform's dataset, there are diminishing returns to scale; in addition, machine learning technologies have been making collecting extensive datasets less and less necessary.

II.47. The three mechanisms outlined above, i.e. an increase in the exclusivity of the user base, an increase in the number of users and an improved ability to target ads, potentially identify three separate ToHs that the Authorities could have explored before clearing the merger.

II.2.2. Market outcome assessment

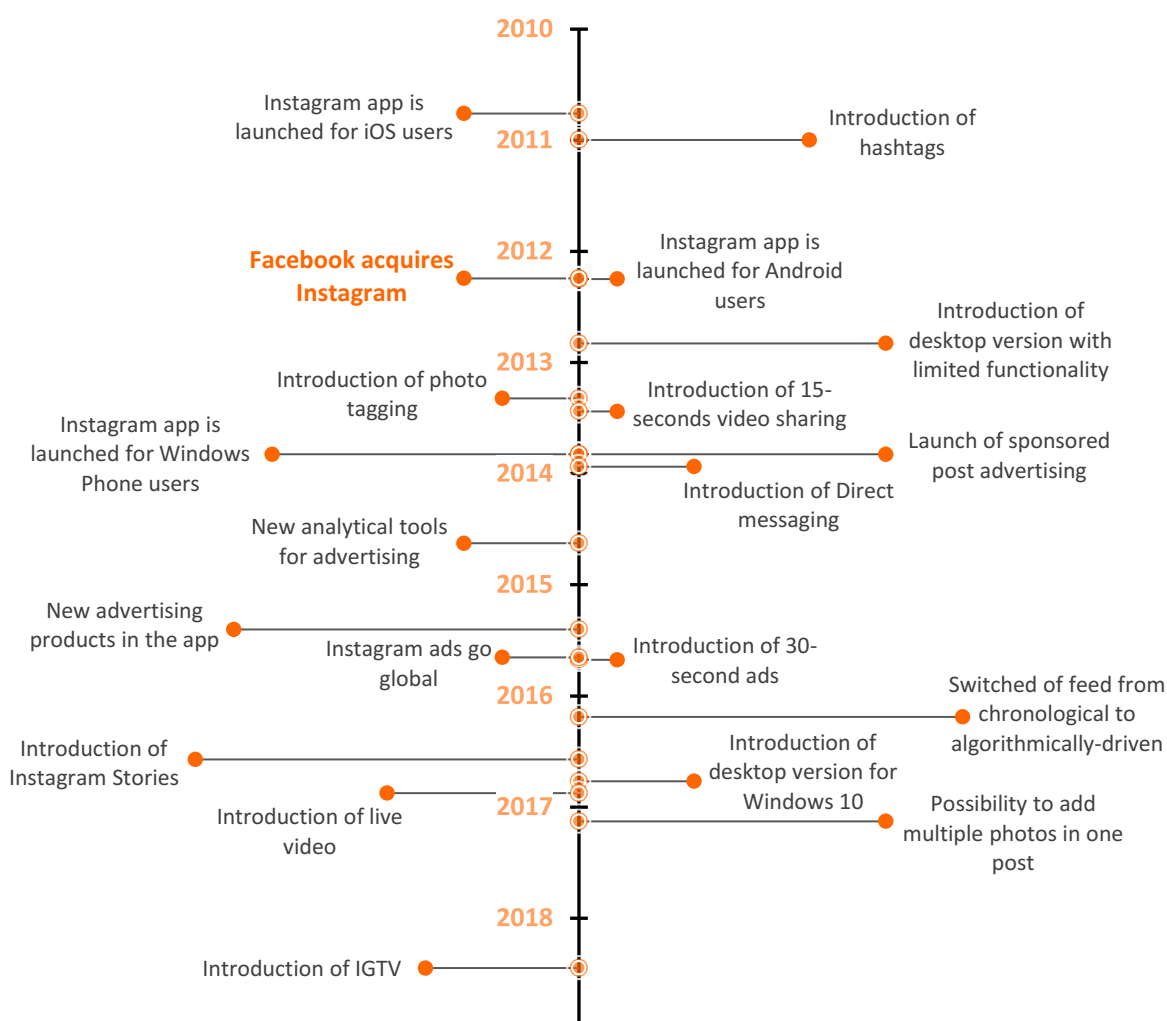
II.48. The market outcome assessment of *Facebook/Instagram* looks at:

- the development of Instagram into a social network (section II.2.2.1);
- the evolution of Facebook and Instagram, and their relative position, in the market for social network services (section II.2.2.2);
- the extent to which the merger has provided Facebook and Instagram with a competitive advantage, compared to the other social networks (section II.2.2.3).

II.2.2.1 The development of Instagram into a social network

II.49. At the time of the merger, the Authorities believed that Instagram was not well placed to compete with Facebook in the short run, as Instagram was a mere photo app, with limited social network functionalities and without any revenue from advertising. Indeed, the rationale for the merger stated by Facebook was to help Instagram grow under Facebook umbrella. Since the merger with Facebook, Instagram has rapidly evolved to a different product, which offers fully-fledged social network functionalities and allows advertisers to place their ads on the platform. Figure II.1 shows the timeline of the main changes made to Instagram since it was launched in October 2010.

Figure II.1: Timeline of main Instagram's changes



Source: Lear

II.50. Some relevant and distinctive Instagram functionalities have been launched before the merger date: for instance, in January 2011, Instagram added hashtags, which is widely used in captions and comments among users. However, typical social networking functionalities (photo tagging⁸⁸ and direct messaging) as well as advertising products were introduced after the merger. Based on the evidence provided by Facebook⁸⁹, the merger has helped Instagram's development in the following ways:

- introduction of new features to improve user experience, such as direct messaging, live streaming, personalized feeds, tags, threads and comments;

⁸⁸ In May 2013, Instagram introduced the photo tagging feature – which allows users to tag their “followers” in a picture – and a specific tab (“Photos of you”) that allows users to check every picture they are tagged in. Photo tagging is a valuable feature which enables the interaction between users in a social networking-like fashion. Photo-tagging has also been gradually extended to brand advertising, paving the way to the influencers who are nowadays among the main users of Instagram. See www.businessinsider.com/instagram-introduces-photos-of-you-2013-5?IR=T.

⁸⁹ This description is based on interviews held with representatives of Facebook.

- provision of physical infrastructure. Facebook had significant experience in managing high volumes of content and delivering it quickly, and provided the cloud space that Instagram needed to continue its growth while still delivering a smooth user experience;
- expansion into different OSs. Facebook helped Instagram in making its app compatible with different operating systems;
- advertising. Facebook provided Instagram with the expertise to show ads in a non-intrusive way.⁹⁰ In addition to Facebook’s expertise, Instagram also gained access to a pool of loyal Facebook’s advertisers and today the merged entity offers combined advertising campaigns which cover both platforms;
- anti-spam and anti-harassment policy. At the time of the merger, Instagram did not have a consistent content policy and did not have the resources to enforce it properly. Instagram benefited from Facebook’s expertise in machine learning and was able to develop and enforce its content policy;
- internationalisation. Facebook helped Instagram to expand globally by providing expertise on language translation. In addition, the desktop version of Instagram was developed, thus facilitating Instagram expansion in those countries where mobile penetration was still lagging behind.

II.51. At the end of 2012, Instagram changed the way that it interacts with other social networks such as Twitter.⁹¹ Instagram users were no longer able to embed a content uploaded to Instagram in their feed on social networks other than Twitter; rather, they were only able to share a link driving traffic back to Instagram. This has arguably deteriorated the quality of Twitter’s users experience: Instagram photos no longer appeared on their Twitter’s feed, but they were just posted as a link back to Instagram. This decision by the merged entity would seem to be consistent with the realization of the foreclosure ToH that was assessed (and dismissed) by the Authorities. However, that ToH entailed the existence of a complementarity between photo apps, such as Instagram at the time of the merger, and social networks. By the time this decision was taken, Instagram was on its path to develop social network functionalities, supplying a service that was arguably a substitute of those supplied by social networks.

II.52. Three years after the merger, Instagram started monetizing its services through targeted advertising. For instance, when a particular Instagram user was in the demographics being targeted, she would have seen the advertising post with the label “Sponsored” above it. Starting from that date, Instagram has become more and more advertising friendly, showing links to a retailer’s site that land directly on the page that allows to purchase a certain good or service. Further, Instagram has become a breeding ground for influencer marketing, a growing tactic used by marketers to build brand awareness and driving customer engagement.⁹²

II.53. Currently, Instagram competes with social networks and is at the fore-front of social networking trends. In August 2016, Instagram launched “Instagram stories”, a 24-hour photo or video slideshow.⁹³ Instagram CEO Kevin Systrom openly admitted that the feature was copied from the Snapchat stories.⁹⁴

⁹⁰ Facebook advised that at the time of the merger Instagram had no advertising infrastructure or a sales team and had no clear plans to develop such infrastructure. Facebook provided Instagram with that infrastructure and with a dedicated sales team.

⁹¹ edition.cnn.com/2012/12/10/tech/social-media/twitter-instagram-photos/.

⁹² Influencer marketing involves brands paying social media influencers to mention advertisers’ products and services in their social media output. CivicScience in December 2018 found that 34% of daily Instagram users in the US have purchased something from an influencer/blogger recommendation, as reported in the eMarketer article “Can Instagram’s Swipe Up Feature Drive Sales” by Blake Drosch.

⁹³ instagram-press.com/blog/2016/08/02/introducing-instagram-stories/.

⁹⁴ www.nytimes.com/2016/08/03/technology/instagram-stories-snapchat-facebook.html.

In June 2018, Instagram's CEO has announced a new feature called IGTV, which allows to upload videos of up to one-hour length and lets users develop Instagram channels including their videos.⁹⁵

II.2.2.2 The evolution of the market for social network services

II.54. Assessing the market structure arising following the *Facebook/Instagram* merger requires defining the markets where the merging parties operate. Facebook and Instagram (i) use information and communication technologies to facilitate interactions between users, (ii) collect and use data about these interactions, (iii) rely on network effects, since the platforms are more valuable to other users as the number of existing users increases, (iv) provide free services to consumers (at least from a monetary point of view) and (v) raise revenue through advertising. The two parties sell access to their users' time and attention to companies for display advertising.⁹⁶ To this extent, Facebook and Instagram are often considered attention brokers, operating in a market for attention, together with other online advertising platforms such as Google, Amazon, Bing, Microsoft, Twitter, LinkedIn, Snapchat, YouTube and many others.

II.55. However, it may be possible to further distinguish among attention brokers based on the service they provide to users and to the added value they provide to advertisers. Being social networks, Facebook and Instagram allow users to connect and interact. Users' interaction is currently provided through a variety of tools, such as messaging and photo/video sharing. From the users' point of view, this may be considered different from the search engine service provided by Google or Bing, or from the social media content provided by YouTube. From the advertisers' point of view, the added value is related to the social graph, the global mapping of users which reveals how they are related to each other and what are their preferences and the preferences of the other users they interact with. In order to achieve their objectives, advertisers, and in particular display advertisers, needs to target the right people, at the right time and in the right context.⁹⁷ They increasingly rely on both demographic (age, gender) and behavioural (interests) data of their customers and, to this end, social networks can leverage social graph information.⁹⁸

II.56. On this basis, for the purpose of this evaluation, we adopt a stricter market definition than that of a broad market for attention, by identifying the market where Facebook and Instagram operate as the market for social network services. The distinctive features of social networks are (i) the connection and interaction among users, and (ii) the ability of mapping users in a social graph of their relationships and preferences.⁹⁹ This market definition embraces both sides of the market, i.e. that of users and that of advertisers.

⁹⁵ [instagram-press.com/blog/2018/06/20/welcome-to-igtv/](https://www.instagram.com/blog/2018/06/20/welcome-to-igtv/).

⁹⁶ Display advertising include banner ads, native ads, sponsored contents, in/out stream video. It is different than search advertising, that is paid-for listing in search results (e.g. sponsored links on Google), and classifieds ads, that involve advertisers paying online companies to list specific products or services, including property, cars (e.g. Autotrader websites). In the UK, search advertising is the largest category of online advertising in terms of digital advertising spend, accounting for 50% of the UK online advertising market in 2017, compared to 36% for display, 13% for classifieds and 1% other formats. Social media accounts for an increasing share of display advertising (in 2017, 57% of online display advertising expenditure in the UK was on social media). This is based on Plum Consulting report commissioned by the Department for Digital, Culture, Media & Sport, Online advertising in the UK, January 2019.

⁹⁷ Plum Consulting report commissioned by the Department for Digital, Culture, Media & Sport, Online advertising in the UK, January 2019.

⁹⁸ In a phone interview, Telefonica UK confirmed that social graph information makes social networks extremely attractive to advertisers as this offers opportunities for in depth targeting.

⁹⁹ Although intuitively simple, selecting which operators, among the hundreds of online platforms operating in digital market, present such features and can be classified as social network is not an easy task. Our analysis relies on the definition used by ComScore, which includes among social networks those online platforms providing (i) a virtual community within Internet

II.57. We do not expect this to be definitive: defining markets in the digital sector is a complex exercise. On the supply side, advertisers may not consider the social graph as a distinctive feature, and still consider the advertising services provided by social media (e.g. YouTube) as a substitute of the service provided by social networks. By the same reasoning, display advertising (which is typically provided by social networks) can be deemed as a substitute for search advertising (which is instead typically provided by search engines).¹⁰⁰ As to the user side, we evaluate the substitutability of the platforms based on the overlap of their functionalities. However, it is hard to define the exact degree of overlap which makes platforms substitutes.

II.58. The proposed market definition appears to be much broader than the one recently adopted by the Bundeskartellamt in its investigation on Facebook data handling practices.¹⁰¹ The Germany Authority has defined the product market where Facebook operates as including Facebook and some smaller providers of social network services. Snapchat, Twitter, Pinterest, LinkedIn and Instagram are not considered to be part of this market, and the main criteria used were the overlaps of functionalities and the presence of networks effects.¹⁰² The Bundeskartellamt has indeed pointed out that direct network effects have proved to be very important in these markets and it is not sufficient to have a critical mass of users to be able to enter neighbouring markets.¹⁰³ While being aware of the uncertainties that characterize such markets, the assessment below relies on a tentative, though more conservative, market definition which encompasses all social networks.

II.59. Figure II.2 shows the number of monthly unique users of the main social networking platforms over the period 2015-2018 in the UK.¹⁰⁴ The number of Facebook users has been relatively stable over time, while the number of Instagram user has doubled, moving from 14 million in March 2015 to 26 million in September 2018. All of the Instagram updates represented successful moves to increase the number of users and, as a result, Facebook and Instagram are currently the largest players in the market for social networking services. In 2017-2018, Twitter and Snapchat boast a similar number of users to Instagram. Snapchat has more than doubled its users between March and September 2017. Google+ has become less and less appealing and its users have been consistently declining since 2015. Pinterest and Reddit have been relatively stable over time, reaching respectively 14 million and 11 million unique users in September 2018.

web sites and applications to help connect people interested in a subject and (ii) a variety of tools, such as email, messaging, photo sharing that allow members to connect.

¹⁰⁰ Plum Consulting report commissioned by the Department for Digital, Culture, Media & Sport, Online advertising in the UK, January 2019.

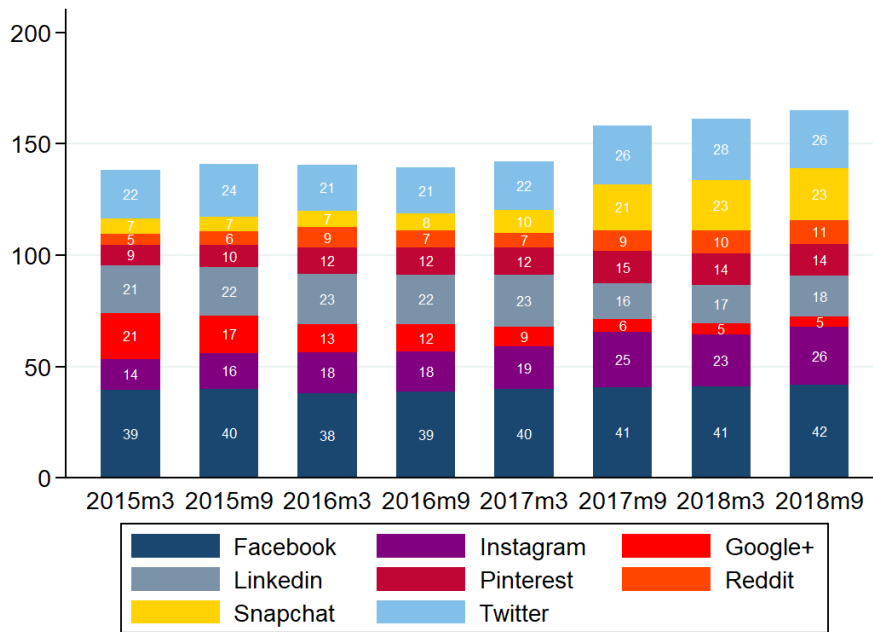
¹⁰¹ Bundeskartellamt decision that prohibits Facebook from combining user data from different sources, February 2019. Available at https://www.bundeskartellamt.de/SharedDocs/Meldung/EN/Pressemitteilungen/2019/07_02_2019_Facebook.html.

¹⁰² For instance, Snapchat is not considered comparable to social network because its central function is a camera that opens automatically for taking “snaps” that are deleted after a short while.

¹⁰³ The decline of Google+ is considered as an example of the importance of direct network effects to succeed in a neighbour digital market.

¹⁰⁴ ComScore defines unique users as the number of users who have visited the platform at least once in a month.

Figure II.2: Number of monthly unique users of social networks in the UK (million)

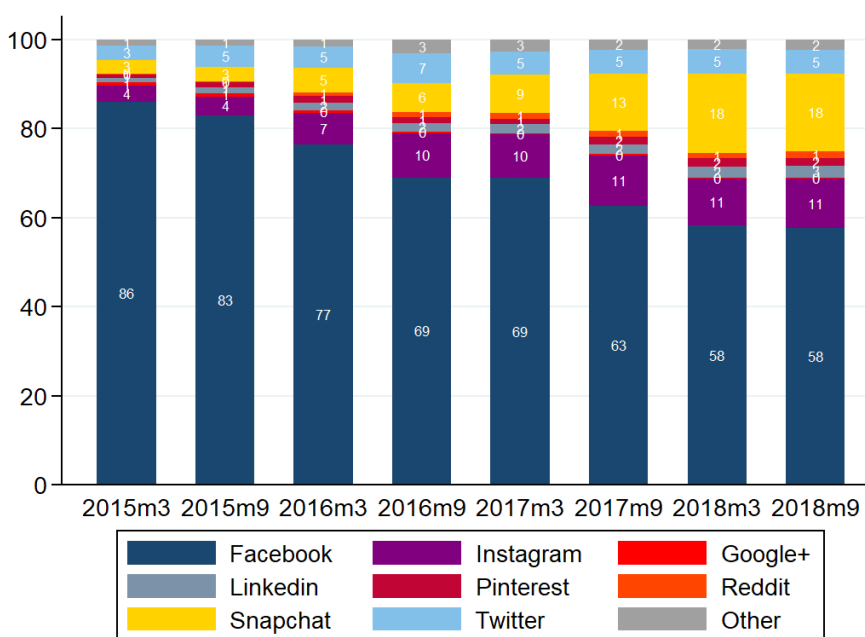


Source: Lear based on ComScore data

II.60. Figure II.3 shows the market shares of social networks in terms of time spent by users.¹⁰⁵ Social networks compete to attract users and their attention. Higher users' engagement, which can be measured through the time they spend on the platform, allows the social network to collect more information on users' behaviour, making it possible to better target users for advertising purposes, thereby supplying a better product to advertisers. More engagement also provides more opportunities for the platform to show ads to users.

¹⁰⁵ Annex D provides the share of time spent by users in a broader market, which includes all social media platforms (Figure D.1).

Figure II.3: Share of monthly time spent on social networks in the UK (%)



Source: Lear based on ComScore data

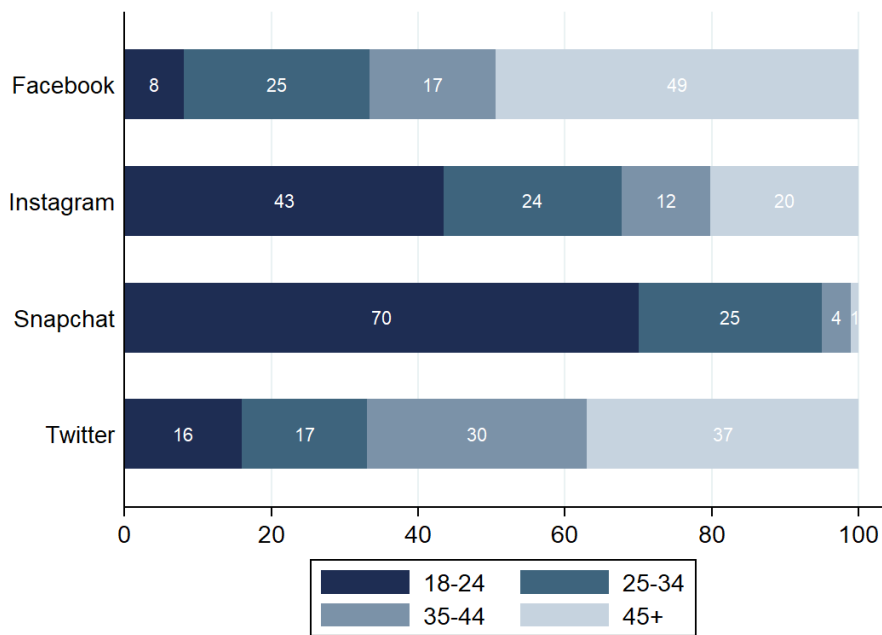
II.61. Considering the time spent on the platform shows a significant decline in Facebook’s market position: the share of time spent by UK users on Facebook falls from 86% in 2015 to 58% in 2018; Instagram share is instead increasing, going from 4% to 11% over the same period. The acquisition has arguably allowed Facebook to partially offset the decline in its users’ engagement.¹⁰⁶ Snapchat is emerging as the most significant challenger to the merged entity, with a share that has reached 18% in 2018. Twitter only accounts for 5% of total time spent on social networks.

II.62. The decline of Facebook’s share of supply can be at least partially attributed to its users’ demographic. Younger users generally spend more time on online platforms,¹⁰⁷ thereby driving up the share of social networks such as Instagram and Snapchat who are more popular among younger age groups. Figure II.4 shows that, in 2017, only 33% of monthly time spent on Facebook is generated by users aged 18-34 years old, compared to 67% for Instagram. Moreover, Facebook and Twitter have similar demographics, both significantly different from those of Instagram and Snapchat.

¹⁰⁶ This is also consistent with a reduction of Facebook’s incentive to invest in users’ engagement after the merger, due to the lessening of the competitive constraint exerted by the competitors and the success acquired by Instagram, now part of its ecosystem.

¹⁰⁷ UKOM Insights: “How much time do people spend online each day?”, July 2018. The report shows that the average time the UK adult digital population spends per day online is 3 hours and 8 minutes. This value varies considerably by age, ranging from 4 hours and 5 minutes for user aged 18-24 to 2 hours and 23 minutes for users aged 55+.

Figure II.4: Share of monthly time spent on social networks in the UK by age in 2017 (%)¹⁰⁸



Source: Lear based on eMarketer data (extracted on March 18, 2019)

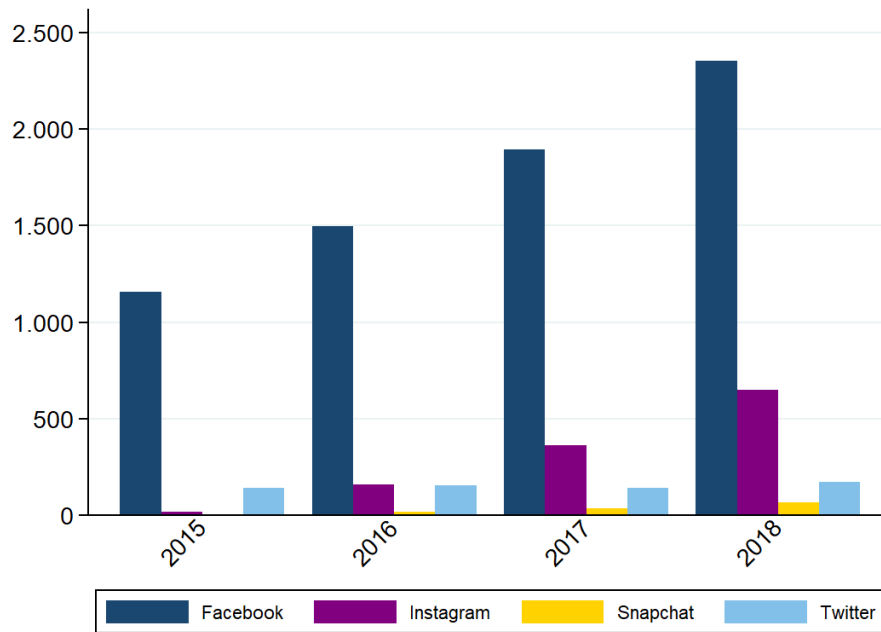
II.63. Social networks monetize their services through advertising and the extent to which Facebook and Instagram growth in terms of usage base and users' engagement has been profitable should be measured through advertising revenues. Figure II.5, Figure II.6 and Figure II.7 show, respectively:

- the digital advertising revenues;¹⁰⁹
- the digital advertising revenues per user. This indicates how much each user is worth, on average, on the advertising side of the market;
- the digital advertising revenues per hour spent on the platform. This indicates how much each hour spent on a platform is worth, on average, on the advertising side of the market. Assuming that the same volume of ads can be shown in an hour across the various social networks, this metric represents a proxy of the price paid by advertisers to reach users on the various platforms.

¹⁰⁸ Data from 2018 does not include Twitter. As to Facebook, Instagram and Snapchat, data from 2018 confirms the main findings from 2017.

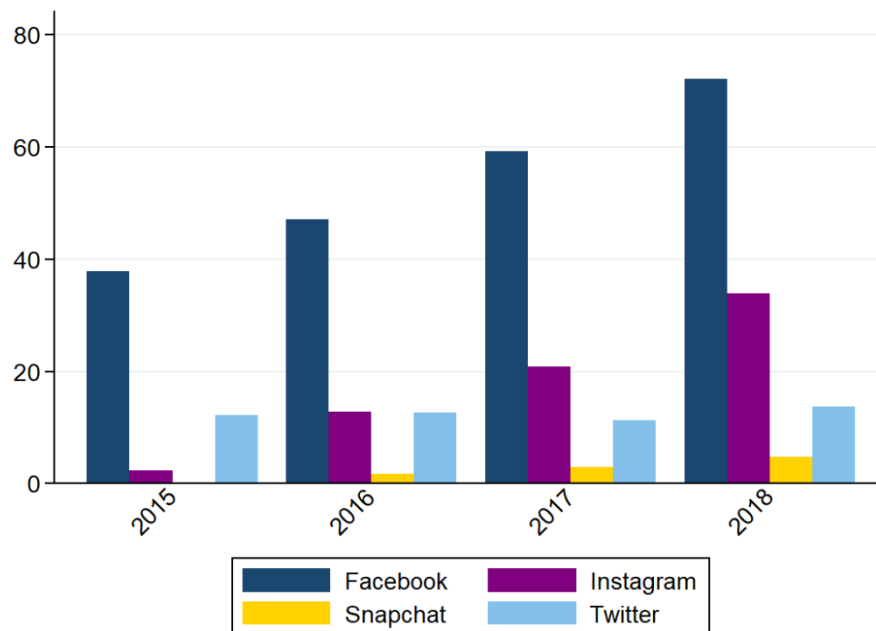
¹⁰⁹ Data on digital advertising includes advertising that appears on desktop, laptop computers and mobile phones, tablets and other internet-connected devices, and includes all the various formats of digital advertising on those platforms. Values are net of traffic acquisition costs (TAC) to partner sites.

Figure II.5: UK advertising revenue for the main social networks (million GBP)



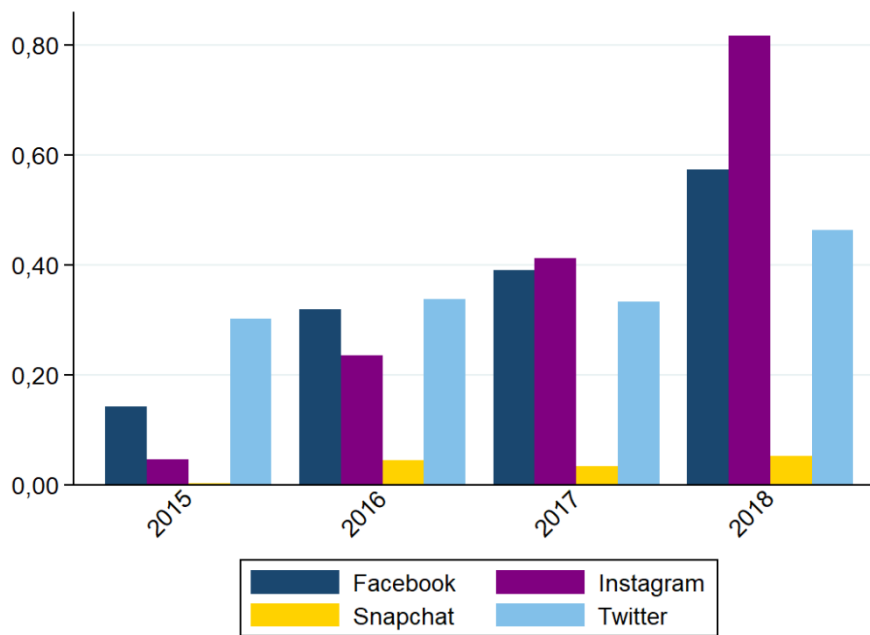
Source: Lear based on eMarketer data (extracted on March 5, 2019)

Figure II.6: UK advertising revenue per user for the main social networks (GBP)



Source: Lear based on eMarketer data (extracted on March 5, 2019)

Figure II.7: UK advertising revenue per 60 minutes for the main social networks (GBP)



Source: Lear based on ComScore and eMarketer data (extracted on March 5, 2019)

II.64. Facebook’s revenues have always been higher than the revenues of other social networks, and the gap has increased over time, despite the decline in its share of time spent (as previously shown in Figure II.3).¹¹⁰ In particular, Facebook’s revenues have increased by 103% between 2015 and 2018. The advertising revenues that Facebook is able to extract from each user have also increased (+90% between 2015 and 2018), as well as advertising prices, proxied by revenues per hour spent, which have experienced a significant increase in 2018 compared to the level of 2015 (+300%).

II.65. Instagram has started to monetize in the UK in 2015, and since then its revenues have increased significantly – as occurred for the number of users – exceeding the revenues earned by other platforms: in 2018, its advertising revenues was equal to £ 649 million, an increase of 3,349% with respect to the level of 2015. Both revenues per user and revenues per hour spent have also experienced a significant growth: in particular, Instagram seems to be able to charge higher advertising prices than Facebook. Twitter and Snapchat, instead, are positioned significantly behind Facebook and Instagram in terms of advertising revenues. Twitter’s revenues have increased over time, but to a lesser extent than Facebook: in 2018, its advertising revenues have increased only by 23% with respect to the level of 2015.

II.66. Despite its share in terms of users and time spent, Snapchat advertising revenues remain lower than Facebook, Instagram and Twitter. However, the growth rate of Snapchat’s revenues has been the highest, compared to the other social networks. For instance, in 2018, Snapchat reached £ 66 million in total advertising revenues, an increase of 5,297% with respect to the level of 2015. Snapchat revenues per user and per hour also increased significantly (+2,150% and +1,293% respectively between 2015 and 2018). This enormous increase was mainly driven by the growth experienced

¹¹⁰ The time spent on Facebook has declined also in absolute terms: the total minutes spent on Facebook in the UK has decreased from 46 billion in March 2015 to 21 billion in September 2018.

between 2015 and 2016. The most recent data seems however to indicate that Snapchat growth may have already peaked.¹¹¹

II.67. Although data indicates a positive trend in advertising revenues for all the main social networks, Facebook and Instagram seem to have a comparative advantage. In 2018 the prices charged by Facebook and Instagram for advertising, proxied by revenues per hour spent, are the highest: advertisers seem willing to pay a premium for the advertising services provided by the merged entity.

II.68. The assessment of the market outcome which has arisen after the merger requires to investigate whether, and to what extent, the merger has contributed to the competitive advantage enjoyed by Facebook and Instagram. This may be a result of the efficiencies achieved through the merger, or the outcome of a distortion of competition which enabled Facebook to exert market power. The following section will perform such assessment, by outlining the mechanisms through which the merger strengthened Facebook's and Instagram's position.

II.2.2.3 The competitive advantage Facebook and Instagram acquired after the merger

II.69. As discussed in section II.2.1.3, three factors seem to play a particularly important role in making one provider of advertising space more or less attractive from the perspective of advertisers:

- the ability to target ads, which in turn depends on the quantity and type of information that the platform can collect on its users;
- the extent to which its user base is exclusive to the platform; and
- the size of its user base.

II.70. The merger has contributed to improving the position of the merged entity across all dimensions. Regarding data combination, the recent investigation by the Bundeskartellamt has confirmed that Facebook "uses and merge" data from its own website and company-owned services (including Instagram and WhatsApp), thereby obtaining detailed profiles of its users.¹¹² This provides the merged entity with a richer information set that arguably cannot be matched by its rivals in the social network market.

II.71. Regarding exclusivity and size, multi-homing makes social networks' users less exclusive, as cross-visiting users can indeed be reached through different social networks. When selling advertising spaces, each social network competes with the others to target cross-visiting users. In such a context, the merger with Instagram has strengthened the position of Facebook as an advertising platform through the following mechanisms:

- Facebook is not subject to the competitive constraint that might have been exerted by Instagram on users who cross-visit the two platforms. More specifically, for all the users who at least cross-visit Facebook, Instagram and another social network, Facebook faces one competitor less than it would have absent the merger, since it does not compete with Instagram to attract advertisers;
- Facebook and Instagram are a single ecosystem, able to monitor how many times a single user is exposed to a certain ad on each of the two platforms. This makes them able to avoid inefficient ads duplications, which advertisers seek to avoid. Interviews to market participants¹¹³ confirmed that advertisers value Facebook and Instagram being a single ecosystem where to buy advertising

¹¹¹ Unlocking digital competition, Report of the Digital Competition Expert Panel, March 2019.

¹¹² See footnote 101. The decision points out that Facebook combines data from its own website, its company-owned services and third-party website and that such conduct represents an exploitative abuse. The Bundeskartellamt established that Facebook-owned services like WhatsApp and Instagram can continue to collect data. However, assigning the data to Facebook user accounts will only be possible subject to the users' voluntary consent. In case the consent is not given, the data must remain with the respective service and cannot be processed in combination with Facebook data.

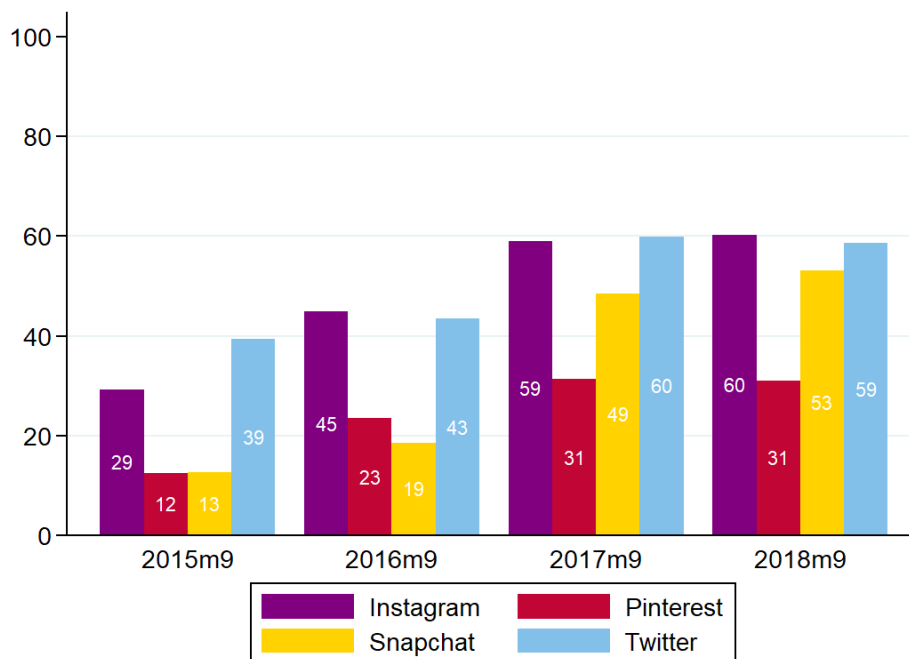
¹¹³ This is based on an interview with Telefonica UK Limited.

spaces, and that Facebook allow advertisers to choose on which platform they want to post their ads, and the desired frequency with which consumers are exposed to the ad on Facebook co-platforms;

- data on users and time spent has shown that Facebook has been able to increase its size and boost users' engagement after the merger. In a market where consumers multi-home, the larger is the platform, the higher is the probability that the platform provides access to the greatest part of social network users. Moreover, since time is a scarce resource, the larger is the time spent on that platform, the higher is the users' engagement on that platform compared to the others. Facebook has become the single spot through which advertisers can efficiently reach and target the largest number of social networks users.

II.72. Figure II.8 shows the percentage of Facebook users who visits other social networks. In 2015, 29% of Facebook users were also visiting Instagram¹¹⁴, and the percentage is increasing over time: in 2018 almost 60% of Facebook users is also on Instagram. The overlapping users between Facebook and Instagram foster Facebook's competitive advantage, as these users are more exclusive than they would have been if Facebook and Instagram were two separate entities.

Figure II.8: Percentage of Facebook's users that visits the main social networks



Source: Lear based on ComScore data

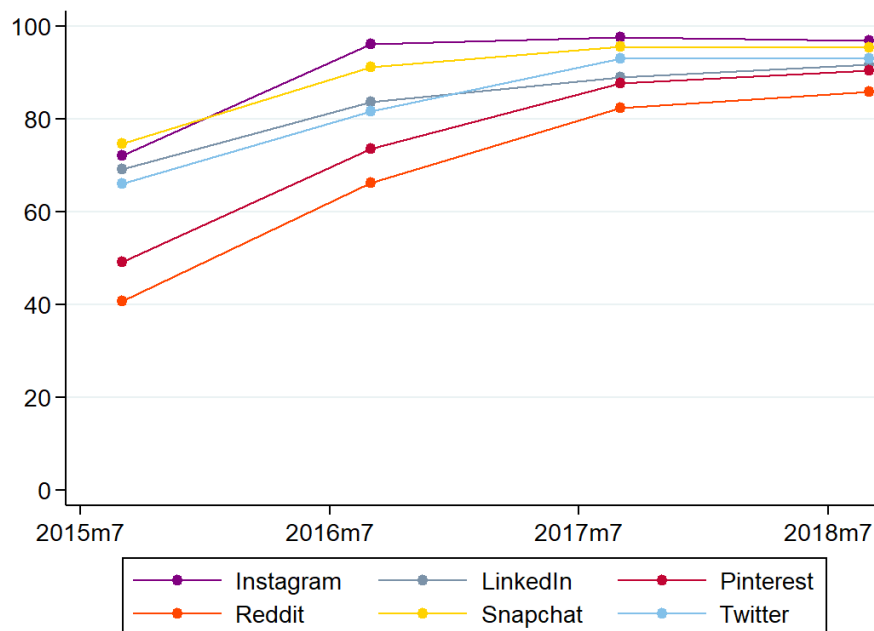
II.73. Facebook also shares its users with Twitter, Snapchat and to a lesser extent Pinterest. In 2018, almost 60% of Facebook users were also visiting Twitter and Snapchat. This implies that, although having relaxed the constraint exerted by Instagram, Facebook is still competing with other social networks to attract advertisers.

II.74. Figure II.9 shows the percentage of other social networks users that visits Facebook in the UK. In 2015, more than half of the users of the main social networks (Instagram, LinkedIn, Snapchat, Twitter)

¹¹⁴ Please note that the available data only allows to measure overlapping users across pair social networks. However, the percentage of social network users who is cross-visiting a second platform, may also cross-visit an additional third platform.

were also visiting Facebook. In 2018, almost all the users of these social networks were also visiting Facebook.

Figure II.9: Percentage of other platforms' users that visits Facebook in the UK



Source: Lear based on ComScore data

II.75. By buying advertising spaces on Facebook, advertisers are able to reach almost all of Instagram, Twitter, LinkedIn and Snapchat users.¹¹⁵ The opposite is not true: Figure II.8 indeed shows that, for instance, when selling advertising space on Twitter, advertisers are only able to reach 59% of Facebook users in 2018. On top of this, Facebook can also provide advertisers with access to users who cross-visits Instagram and other social networks. For instance, in 2018, 60% of Twitter users cross-visited Instagram.¹¹⁶ This gives the merged entity the ability to reach those Twitter users who do not use Facebook but use Instagram. By enhancing the size of Facebook, and fostering users' engagement, the acquisition of Instagram might have increased attractiveness to advertisers and, in turn, ability to exert market power.

II.76. Assessing whether this could be interpreted as an effect of the Authorities' decision to clear the merger would first require identifying what would have occurred to Instagram in the absence of the merger, i.e. in a counterfactual scenario. Two alternative counterfactuals to the clearance can be identified:

¹¹⁵ This could have been more properly measured by observing how consumers allocate time between social networks: for instance, a Twitter user that simply visits Facebook once a month, without spending a significant amount of time on the platform, is much more valuable to an advertiser when he or she is on Twitter rather than on Facebook. Unfortunately, the available data does not allow to measure how consumers spread their time among social networks. Nonetheless, since time is a scarce resource, the share of overlapping users can still reasonably raise the concern that Facebook, by being able to attract the visit of most of the social networks' users, is increasingly able to engage their attention.

¹¹⁶ Annex D provides the percentage of other social networks that visits Instagram in the UK over time (Figure D.2).

- Instagram would have become a popular social network and Facebook would have faced a strong competitor in the social network market. The example of Snapchat suggests that it may have been possible for Instagram to continue its growth without help from Facebook;
- Instagram would not have been able to grow further and monetize its users base. Instagram would have struggled to expand its functionalities without Facebook's guidance¹¹⁷ and its growth would have stalled in absence of the infrastructure needed to manage a growing user base.

II.77. In both counterfactual scenarios, Facebook may have encountered some difficulties into targeting the youngest users, and competing with the emerging mobile-first platforms, such as Snapchat. Data indeed seems to suggest that the growth in Facebook and Instagram share of time spent has been driven by Instagram.

II.78. Compared to a counterfactual scenario where Instagram would still have become a popular social network, the merger has increased Facebook ability to exert market power, by eliminating a viable and strong competitor in the market of social networks. Compared to a counterfactual scenario where Instagram would have not been able to grow as a social network, the merger may still have provided Facebook the way to strengthen its competitive advantage. The merger may have provided Facebook with the tools to enhance its usage base and engagement and still aggressively compete with existing competitors (e.g. Twitter) and new entrants (e.g. Snapchat).

II.79. Compared to both counterfactuals, the merger has generated efficiencies. Being able to monitor consumers behaviour on its platform and on Instagram, Facebook can effectively target advertising and reduce inefficient ads duplications on its platforms. On the one hand, this has fostered the competitive advantage of Facebook and Instagram. Advertisers seem to prefer Facebook and Instagram, and pay a premium for their services, because of, among other factors, their ability to reach nearly all users contracting with a single entity and control the number of ad impressions. On the other hand, this may have generated benefits to consumers, who generally perceive advertising as a nuisance. Such efficiencies are merger specific: they would not have arisen in the absence of the *Facebook/Instagram* merger, or in case Instagram had been acquired by an entity different from a social network.

II.80. In conclusion, the effects of the Authorities' decision to clear the merger on consumer welfare depend on the balance between likely anticompetitive effects and efficiencies, which in turn heavily depend on the selected counterfactual. There are no elements to identify which counterfactual would have been more likely. Stronger anticompetitive effects are expected in the case where Instagram would have become a viable competitor alone or if acquired by a third party: in this case, efficiencies would need to be high enough to compensate for the loss of competition. However, data suggests that Snapchat has not been able to monetize engagement to the extent that Instagram did, which is perhaps the signal that Facebook's role in the development of Instagram with respect to advertising was significant.

II.2.3. Conclusions on Facebook/Instagram

II.81. There are a number of gaps in the way the Authorities have assessed the *Facebook/Instagram* merger:

- using the number of downloads to measure market shares may be problematic in the context of digital markets, including the ones where the merging parties operated. Downloads are usually free and simple, consumers might decide to try more than app, but actively use only the one(s) that better responds to their needs. The metric used should instead reflect actual usage;

¹¹⁷ For instance, according to Telefonica UK, Facebook might have played an important role in Instagram's ability to promptly mimic competitors' functionality such as the stories, which now represent a significant portion of users' experience on Instagram but were originally made popular by Snapchat.

- differently from what the Authorities argued, at the time of the merger Instagram was generating significant user engagement. This made Instagram different from other photo apps and well placed to start monetizing its services by selling advertising space;
- the Authorities indicated that available evidence did not show that Instagram was particularly well placed to compete against Facebook in the supply of social network services. However, the evidence available to the Authorities would not seem to unambiguously support this conclusion, most notably because of the level of user engagement already generated by Instagram at the time and of its plans to supply social network functionalities;
- the Authorities assumed that a strategy aimed at foreclosing rival social networks would not have been profitable because Instagram’s popularity hinged on the ability of its users to interact with their preferred social networks. However, available evidence showed that this was not necessarily the case. Moreover, adopting the pre-merger situation as the counterfactual, any user lost by Instagram would not have resulted in a monetary loss for the merged entity, since Instagram was not raising revenue at the time;
- it may have been appropriate to evaluate the incentive to foreclose in a more dynamic manner. Had Instagram grown as a result of the merger, and become a must-have among photo apps, the incentives to foreclose could have changed.

II.82. Moreover, the Authorities placed significant attention to the function that the merging parties’ apps performed and whether the range of functionalities they offered made them substitutes or complements. However, even though the apps of the merging parties performed different functions, they may still have competed with each other as both were potentially in the business of harvesting consumer attention and selling it to advertisers. The Authorities’ analysis of the advertisers’ side of the market might have neglected some factors that drive advertisers’ choices: chief among these are exclusivity of the user base, size of the user base and accuracy in targeting. The Authorities could have assessed how the merger could have affected each of these.

II.83. The assessment of the market structure which has arisen after the merger shows that the acquisition of Instagram has provided a competitive advantage to the merged entity across all three dimensions, which has resulted in unmatched growth in terms of users and advertising revenues. However, there are reasons to believe that Instagram’s growth has significantly benefitted from the integration with Facebook: Snapchat’s case shows that transforming users’ attention into advertising revenue is no easy task, and Instagram’s success in this respect has likely benefitted from Facebook’s guidance and expertise.

II.84. Finally, whether the decision has ultimately harmed consumers also depends on the benefits accrued through the merger, which may have countervailed anti-competitive effects. Being able to monitor consumers’ behaviour on its platform and on Instagram, Facebook can effectively target advertising and reduce inefficient ads duplications on its platforms. This may have generated benefits to consumers, which may have not arisen in the absence of the merger. These efficiencies seem also to be merger-specific, and it is difficult to assume that they would have arisen in a counterfactual scenario where Instagram was not acquired by Facebook or another social network.

II.3. GOOGLE/WAZE

II.85. On 11 November 2013, the OFT cleared Google’s acquisition of Waze. Google operated an Internet search engine offered for free to its users and sold advertising space on its websites and on partner websites; moreover, it offered Google Maps, a free application providing mapping and navigational services that could also be used by third parties on their own applications buying access to Google’s API for Google Maps. Note, however, that the Google API offered limited functionalities: turn-by-turn navigation, for instance, was only made available by Google on its own products. Waze provided another map application that was only available for mobile devices. Its distinctive offerings included live maps, real-time traffic updates and turn-by-turn navigation. Turn-by-turn navigation is a feature of navigation devices where directions for a selected route are continually presented to the user in the form of spoken and/or visual instructions. The parties overlapped in the supply of turn-by-turn navigation applications for mobile devices. Therefore, in assessing the competitive impact of the *Google/Waze* merger, the Authorities focused on two horizontal issues, namely whether by removing a growing and innovative competitor to Google such as Waze, actual and/or potential competition in the market for mobile turn-by-turn navigation applications could be significantly affected, with the result of reducing the parties’ incentives to innovate and the quality of the service offered to users.

II.3.1. Methodology assessment

II.3.1.1 Identification of ToHs pursued by the Authorities and key elements underpinning them

Actual competition in the supply of turn-by-turn navigation apps for mobile devices

II.86. The OFT investigated whether an SLC could arise from the removal of the competitive constraint the parties were exerting on each other in the market for turn-by-turn navigation apps for mobile devices. The OFT looked at the closeness of competition between the merging parties and the relative extent of the constraints coming from other competitors. This ToH was dismissed based on the argument that Waze had not reached a sufficient user base in the UK to build a map with coverage and accuracy comparable to Google’s;¹¹⁸ and that there existed other providers of turn-by-turn navigation apps exerting strong competitive constraints on Google, with particular emphasis on the role of Apple Maps. The evidence the OFT relied on to reach these conclusions was a mix of third parties’ submissions and the parties’ internal documents. In particular, third parties’ submissions generally considered that Waze’s UK map data did not represent a high standard that could be comparable to Google Maps at the time of the merger, although it had the potential to improve over time due to Waze’s data generating process. [REDACTED]

Potential competition in the supply of turn-by-turn navigation apps for mobile devices

II.87. The OFT was concerned that Waze could represent a disruptive force in the market going forward and that the removal of future rivalry between the parties caused by the merger could therefore dampen Google’s incentives to innovate and improve product quality. In order to assess the likelihood of this scenario, the Authorities looked at:

- data on Waze’s growth, mainly obtained from internal documents, which indicated that, while Waze had witnessed strong growth in a relatively short time, [REDACTED]

¹¹⁸ Note, indeed, that, although many suppliers provide their applications for free and earn their revenue from advertisers, attracting enough users is paramount since mapping is a “positive feedback business”, where the more users there are the more data is created, which improves the experience attracting yet more users.

- the extent to which network effects could accelerate future growth. Network effects stemmed from the fact that Waze used a community-based application to develop its maps, entailing that the quality of the product and therefore the value generated for end users increased with the number of users. For instance, Waze’s model required a minimum number of registered users for it to have a good understanding of prevailing traffic conditions within a given territory. The parties’ internal documents allowed the Authorities to conclude that the scale achieved by Waze in the UK was not enough for Waze to benefit from significant and insuperable network effects;
- the role of partnerships. Indeed, partnerships can make a company grow into a significant competitor. [REDACTED]
- the existence of other competitors which would continue to represent strong competitive constraints on Google Maps.

II.88. Taken overall, this evidence was not considered sufficient by the Authorities to conclude that Waze could grow into a disruptive force in the UK market.

II.3.1.2 Analysis of the key elements underpinning ToHs

Actual competition in the supply of turn-by-turn navigation apps for mobile devices

II.89. The dismissal of the actual competition ToH rested on two key elements:

- Waze’s limited user base and map coverage/quality in the UK;
- the existence of other providers of turn-by-turn navigation exerting strong competitive constraints on Google, and in particular Apple Maps.

II.90. Waze’s limited user base and map coverage/quality in the UK was correctly considered by the Authorities as a factor that diminished the competitive relevance of Waze. Given Waze’s business model, the two go hand in hand: the larger the user base, the greater is the contribution to the map accuracy by users. While the limited user base in itself diminished Waze’s competitive relevance, it was also correctly identified by the Authorities as an indication that map data was of limited quality, further weakening Waze’s ability to compete effectively with Google for UK users.

II.91. However, there is a question of whether the reliance on the competitive constraint exerted on Google Maps by Apple Maps may have been to some extent overplayed. Apple Maps was only available on iOS devices, which represented 30-31% of smartphone sales in the UK at the time of the merger (as shown in Figure II.15). Apple Maps could represent an indirect constraint on Google Maps for Android devices only to the extent that Google cannot discriminate between the two OSs. If Google were to lower the quality of Google Maps on Android, for instance by introducing ads – which, being generally considered as a nuisance, would represent a drop in quality – Android users would not be able to switch to Apple Maps. This may have meant that Apple Maps was not fully able to exert a competitive constraint on Android devices, which accounted for 55% of smartphone sales in the UK.

II.92. It is also unlikely that Apple Maps could have exerted an indirect constraint, as instead argued by the OFT, which observed that “Apple Maps acts as a competitive constraint across platforms because any innovations on one platform will extend to other platforms reflecting competition for the handset”.¹¹⁹ For this to occur, the range and quality of turn-to-turn navigation apps available on the various OSs would have needed to be a factor driving choices of consumers in the smartphone market. Users would then have responded to a drop in the quality of Google Maps, or any other expression of

¹¹⁹ *Google/Waze*, footnote 33.

market power, by adjusting their choices in the smartphone market, thereby providing an additional, indirect constraint on Google. However, there is no evidence that this was the case: smartphones are complex products and the choice of the OS by users is likely to be informed by a wider range of factors than the turn-to-turn navigation apps available on that OS.

II.93. Given the limits to Apple Maps' ability to represent a competitive constraint, at least for Android devices, it is unclear which other app could be characterized as closer competitors to Google Maps than Waze. The other two "native" maps applications were correctly ruled out by the OFT: Bing Maps did not provide turn-by-turn navigation at the time of the merger; Nokia HERE did, yet the OFT considered that, despite being pre-installed on Nokia devices, it could be at a competitive disadvantage having access to a smaller user base than Google and Apple (iOS and Android accounted for over 80 per cent of the sales of new smartphones). Then the Authorities looked at the applications developed by established portable navigation device (PND) and in-car navigation manufacturers such as TomTom, Garmin, Navigon and NNG which had at their disposal high-quality map data. However, the available evidence indicated that these applications had achieved low penetration on mobile devices despite having been available for many years. Finally, the OFT considered that the many application developers licensing map data from the established owners of navigable digital map databases had lower download and usage figures than Waze, with the exception of Navfree.

II.94. In addition, there were other pieces of evidence pointing to Waze being a close competitor:

- another developer of a map application submitted that the transaction removed Google's closest competitor for turn-by-turn navigation;
- Waze publicly defined itself as "the only reasonable competition" to Google Maps in real-time traffic information;
- in September 2012, Apple mentioned Waze (along with Bing and MapQuest) among the apps it recommended to iOS users while it improved its own map application.

II.95. In conclusion, it remains unclear which turn-by-turn navigation service for mobile devices was the closest competitor to Google Maps on Android devices, which represented the largest slice of the smartphone market in the UK.

II.96. More fundamentally, the Authorities, probably in the absence of a price being charged to users for navigation apps, investigated whether the disappearance of a competitor such as Waze could have resulted in diminished incentives to innovate. However, as thoroughly discussed in section I.2.3 and in annex A.3.2, there is no clear link between mergers and innovation. Similar ToHs developed by other competition authorities, discussed in section I.4.1.4, have typically set out why, in the specific market where the merger took place, competition was also in the innovation space. In *Google/Waze*, the relationship between competition and innovation is assumed rather than demonstrated.

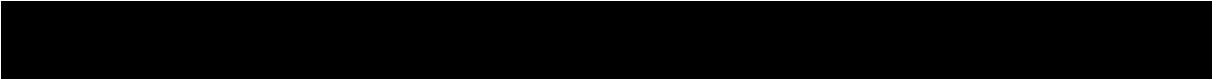
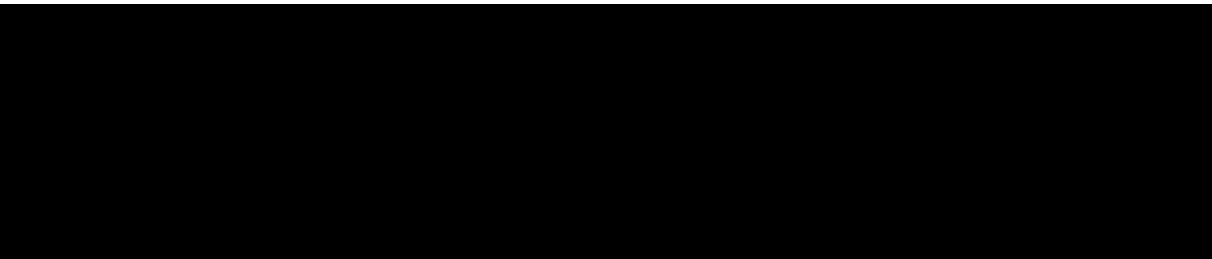
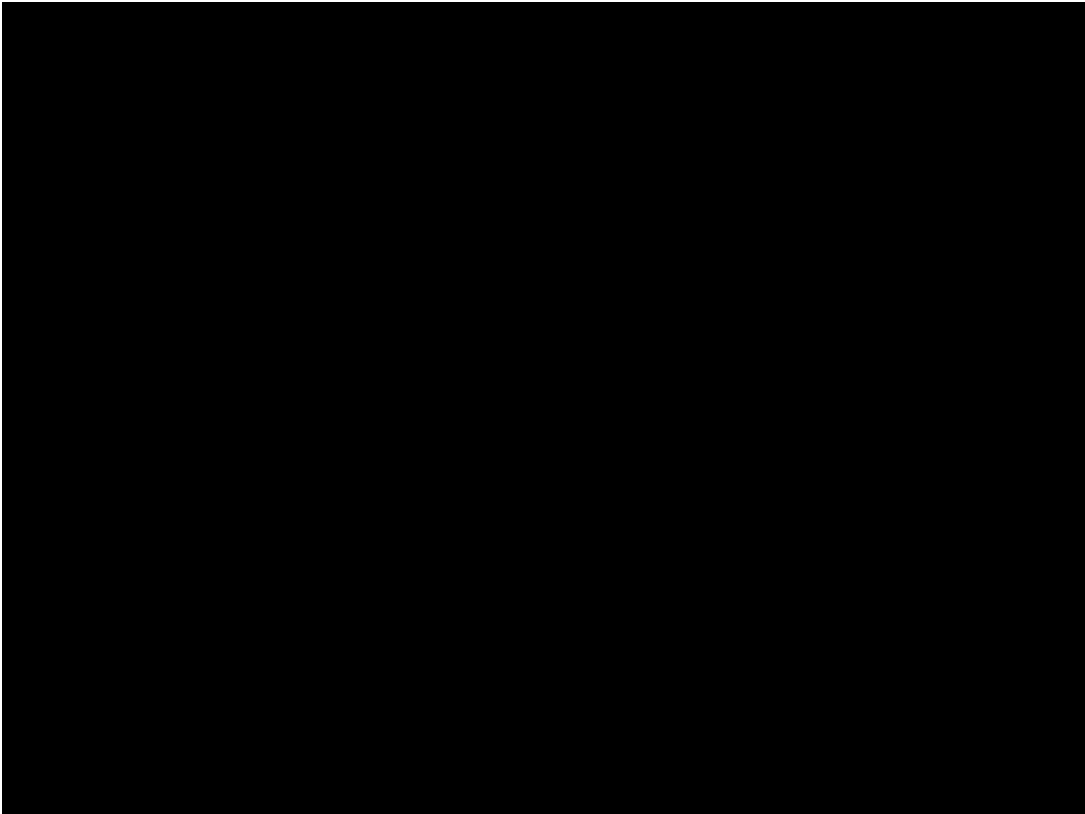
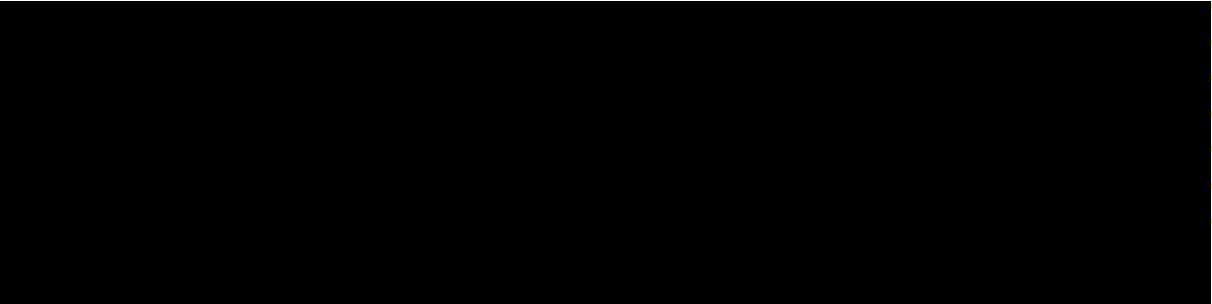
Potential competition in the supply of turn-by-turn navigation apps for mobile devices

II.97. The dismissal of the potential competition ToH rested on:

- the fact that future growth projections were uncertain and the number of downloads in Europe was actually below forecast;
- the limited scale achieved by Waze in the UK, which was not enough for Waze to benefit from significant and insuperable network effects;
- the uncertainty with respect to the effect, in terms of growth, of the partnership with ██████████
- the existence of other competitors which would continue to exert strong competitive constraints on Google Maps.

II.98. While lagging significantly behind Google Maps, Waze was among the most popular navigation apps among Android and iOS users. Future growth is always uncertain, but the evidence collected by

the Authorities with respect to past growth and the opinions of third parties and of the merging parties themselves clearly signalled that there was significant potential to Waze, as did the greater success that Waze had reached in other countries at the time of the merger.



it could have still provided an indication that Waze was perceived as having significant potential.

¹²⁰ This information was provided by Google.

II.102. Waze’s business model, based on crowd-sourcing of most information needed to feed the app, was also a relevant factor pointing to possible future growth. Indeed, crowd-sourcing of information not only decreases entry costs by providing a cost-effective alternative to purchasing maps information from third parties; it also makes improvements to the app, in terms of maps accuracy and reliability of live traffic information, relatively less costly to implement. [REDACTED]

II.103. As explained in section I.2.1 and in Annex A.1.2, the installed user base could constitute a source of competitive advantage for Waze, that the Authorities referred to as first mover advantage. Third parties consulted by the Authorities expressed concerns that it would have been difficult for an entrant to replicate the success achieved by Waze with an equivalent model. The OFT just considered that crowd-sourcing was not unique to Waze,¹²¹ but it did not assess the likelihood with which other operators could have successfully achieved a critical mass.¹²² Relatedly, the OFT somewhat misinterpreted the role played by network effects in this market, arguing that it did not “consider that, on the basis of the evidence, Waze had achieved sufficient scale in the UK to the extent that it was benefitting from significant and insuperable network effects, or that this would lead to an acceleration in its future growth”. However, the relevant question was not whether Waze already enjoyed insuperable network effects, but rather whether network effects could play a role in accelerating growth. Indeed, Waze had found a way to leverage network effects: the larger the user base, the more contributions to the quality of the maps and of the service in general; since better quality attracts more users, a positive feedback loop is created.

II.104. Finally, while the Authorities correctly identified partnerships as a sensible path to growth, they underplayed the significance of Waze’s potential partnerships [REDACTED]. As already mentioned, [REDACTED]

[REDACTED] This could have been significant given the advantage enjoyed by native apps. In addition, [REDACTED] This would have given it access, or at least visibility, to a significant number of prospective users. While there was uncertainty as to the effect of these partnership, it was a signal that Waze had identified a promising path to growth.

II.105. In conclusion, the Authorities seem to have discarded valuable pieces of evidence signalling that Waze may have become a relevant competitor to Google Maps. At the same time, they may have put too much weight on the existence of other competitors, especially for Android devices. Still, it is hard to say whether such evidence would have been enough for the Authorities to adopt a different decision, meeting the probatory standard needed to block a merger.

II.3.1.3 Analysis of completeness of ToHs pursued

II.106. ToHs developed by the Authorities focus solely on the effect that the merger could have had on the users’ side of the market. However, turn-by-turn navigation apps are provided to users for free and are monetized elsewhere. The Authorities only briefly mentioned monetization channels,

¹²¹ In particular, the OFT noted that OSM and, to a lesser extent, Google itself had used crowd-sourcing to develop map data.

¹²² Certain third parties considered that Waze had a significant first mover advantage. The supplier of a rival navigation app submitted that OSM had poor quality control compared to Waze and expected its users to dry up if Waze were to become successful.

observing that Waze at the time of the merger raised little advertising revenue in the UK; the way that Google monetizes Google Maps is not explored.

II.107. This makes the range of ToHs analysed in the decision incomplete. Current business models and monetization avenues should represent an unavoidable step for the development of a ToH because, quite simply, market power is not exerted for its own sake, but has the ultimate objective of increasing profits. The incentives to, for instance, reduce innovation efforts and deliver lower quality to users do not directly depend on the number of users lost, but on the revenue lost due to that drop in users.

II.108. As will be discussed more thoroughly in section II.3.2.3, monetization channels for turn-to-turn navigation apps include, *inter alia*, the following:

- ads for local businesses shown when using the navigation app. This is one of the monetization strategies used, for instance, by Waze, which shows pins and/or banners for local businesses while the user is using the app;
- local search ads. When users search for nearby businesses via Google Search (for example, “coffee near me”) or on Google Maps, they may see local search ads that feature business locations appearing at the top of search results;
- online advertising in general. Location data represents yet another valuable input for advertisers to better target their ads to the correct eyeballs (please see section I.2.4 and Annex A.4 for a discussion on the role played by data in digital markets);
- access to APIs. For instance, Google provides developers with access to certain maps information in exchange for a fee;
- market intelligence. For instance, offline retailers may use location data as an input to evaluate potential store performance.

II.109. The activities listed above potentially identify markets where it was possible, at least in theory, for the merger to produce anti-competitive effects. In particular, as a result of the merger, Google adds yet another source of location data, i.e. that generated by and attributable to Waze users. In this way, users lost to Waze, or gained by Waze at the expense of other navigation apps, continue to provide Google with information that is valuable for a variety of purposes, thereby reinforcing Google’s position in the correspondent markets.

II.3.2. Market outcome assessment

II.110. The market outcome assessment of the *Google/Waze* merger looks at:

- the complementarity between Google and Waze and how this might have been exploited after the merger (section II.3.2.1);
- the evolution of Google and Waze users before and after the merger, and their relative position in the market compared to other providers of turn-by-turn navigation apps (section II.3.2.2);
- the multiple uses of location data, and how the merger may have contributed to the collection and exploitation of such data (section II.3.2.3).

II.3.2.1 The complementarity between Google and Waze

II.111. Google Maps and Waze both provide turn-by-turn navigation services but are fundamentally different in terms of how this service is powered, generating scope for significant synergies. For Google Maps, Google mostly relies on licensed map data and on data gathered through more traditional means such as satellite imagery and street view cars. Waze map data is instead created through crowd-sourcing, i.e. through the contribution of the Waze community; moreover, Waze relies on its users to gather real time data on incidents and traffic conditions.

II.112. Both Google Maps and Waze directly monetize mapping services through advertising. Google has introduced map ads in 2016 and offers different types of direct advertising on Google Maps, such as:¹²³

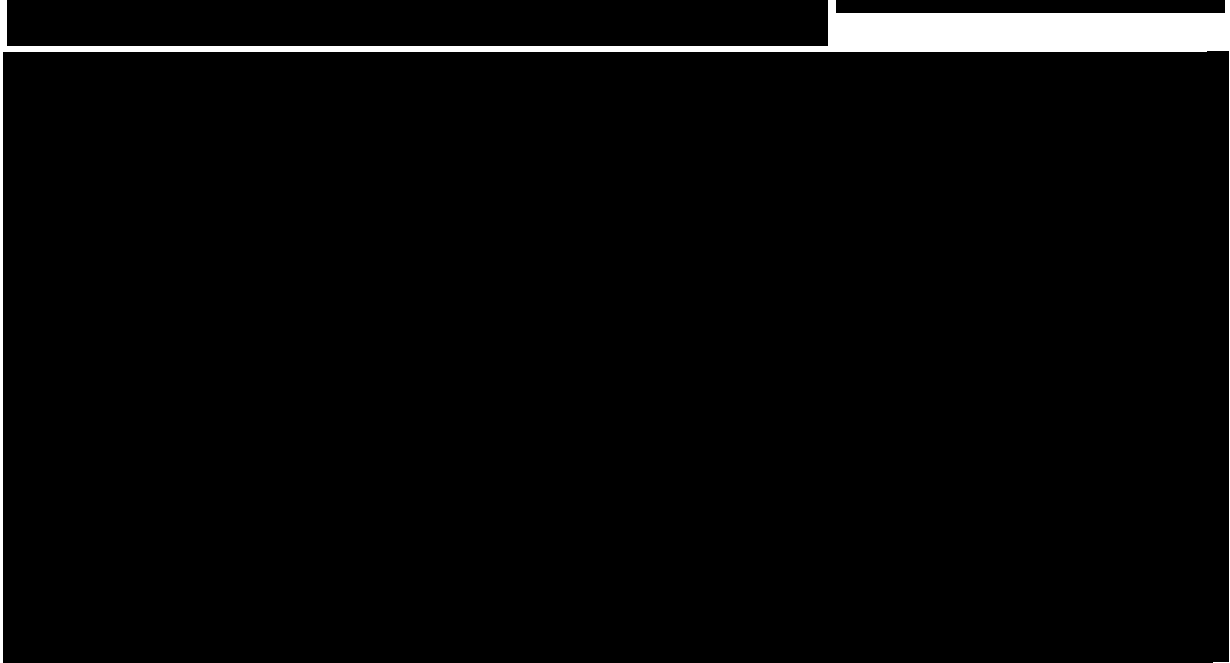
- local search ads, that appear in response to queries within Google.com and Google Maps. The advertised content is displayed at the top of results and reports relevant information such as address and opening hours. The advertised result is also shown as a pin on the map;
- Place Page Ads, that appear after a specific location has been selected following local search queries within Google.com and Google Maps;
- Promoted Places, which appear in the form of branded icons on Google Maps when someone is browsing without any specific location query.

II.113. Waze has introduced advertising in 2012, offering the following advertising solutions:

- search ads, which are similar to Google Maps local search ads;
- Branded Pins, that appear when someone is using the app without any specific query, as Promoted Places in Google Maps;
- takeovers, which are ads that appear as half-screen pop-ups when a driver is at a full stop (e.g. stop at a red light);
- arrows, which are expandable icons that point to a nearby store or site out of the current field of vision on the map.

II.114. The advertising strategy employed by Waze has been to target users around their current location, by showing what is near them while they are in motion. In particular, most of advertisers on Waze have always been fast-food restaurants, gas stations, convenience stores and, in general, companies that have multiple retail outlets throughout the country.¹²⁴

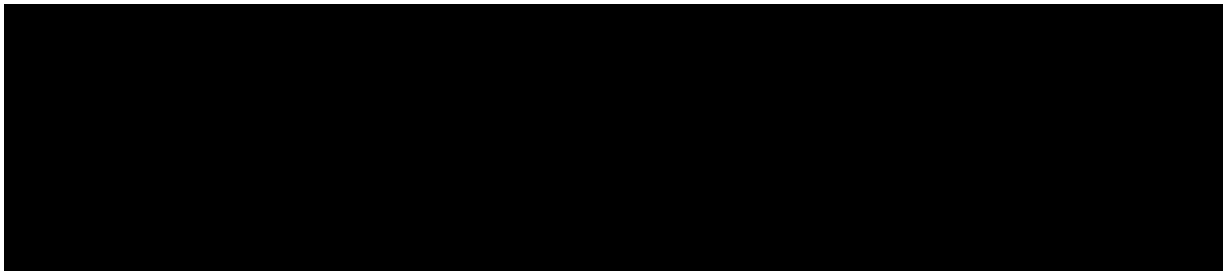
■■■■■ The merger of Google and Waze may have allowed the two companies to exploit their complementarity, improve their apps and realize some efficiencies. ■■■■■



¹²³ Report by eMarketer: “Maps and navigation apps: discovery, exploration features open up ad opportunities”, July 2018.

¹²⁴ Interview with Anasofía Sánchez Juárez, Director General, Operations and Country Manager of Waze in Mexico, 25 July 2018. Available at: content-na1.emarketer.com/why-advertisers-are-flocking-to-waze.


■■■■■



II.116. The sharing of data and information, the reduction of the costs of entering new geographic areas, the access to a shared cloud infrastructure all represent synergies between Google and Waze that the merger allowed to exploit. Moreover, efficiencies that resulted in the improvement of Google Maps were realized to the benefit of all Google Maps users. Google Maps' high market penetration (shown in Figure II.13 and Figure II.14) means that a large number of users have benefitted from them, making efficiencies quite significant.

II.3.2.2 Evolution in the supply of turn-by-turn navigation apps

II.117. The evolution of the number of users of Google Maps can be fully appreciated when separately looking at the main OSs for mobile devices (i.e. Android and iOS). Indeed, Google Maps has always been the native maps application in Android devices, while it has been the preinstalled map in iOS devices only until September 2012.





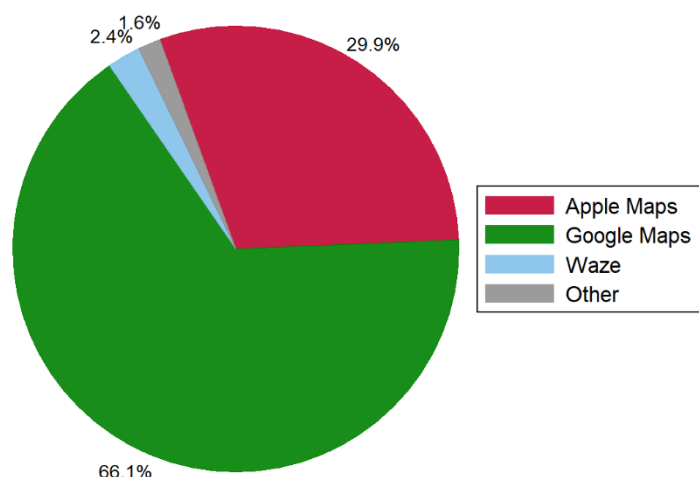
II.119. The significant decrease experienced by Google Maps on iOS devices before the merger is related to the introduction of iOS 6 in September 2012. Before the launch of this iOS update, Google Maps was the preinstalled map application on all iOS devices. However, after 2012 Apple decided to replace Google Maps with its own map application, therefore preinstalling Apple Maps in its devices. Although Apple Maps encountered some problems when it was introduced¹²⁷, it benefitted from being the native mapping services on iOS devices and, as such, it was integrated with other iOS native application (e.g. Siri, Mail). Apple Maps has made major adjustments and improvements over time and, as shown below, has been able to remain the main mapping services used on iOS devices.

II.120. Waze has expanded its usage base in the years after the merger. Figure II.12 shows the evolution of the number of Waze users, by operating system, before and after the merger with Google (2012-2018).



¹²⁷ When Apple Maps was released, consumers complained about its poor accuracy. On 28 September 2012, Tim Cook, Apple’s CEO, released a public letter in which he apologized for the poor performance of Apple Maps and suggested alternative maps applications to be used while Apple was fixing the problems and errors of Apple Maps.

Figure II.13: Share of supply in turn-by-turn navigation apps, 2015m1 (% of unique users)¹³⁰



Source: Lear based on ComScore data

II.122. As outlined in section II.3.1, at the time of its decision, the OFT relied on the fact that there existed other providers of turn-by-turn navigation apps, different from Waze, that would continue to represent strong competitive constraints on Google Maps, particularly Apple Maps. The evidence collected shows that after the merger Google has remained the main provider of turn-by-turn navigation services, with a share of 66%, followed by Apple Maps (30% share) and Waze (2% share).¹³¹

II.123. Few of the existing competitors seem to rely on a crowd-sourced data and they attract very few users.¹³² This may be consistent with Waze's first mover advantage and with the concerns expressed by third parties that it would have been difficult for an entrant to replicate the success achieved by Waze with a similar model.

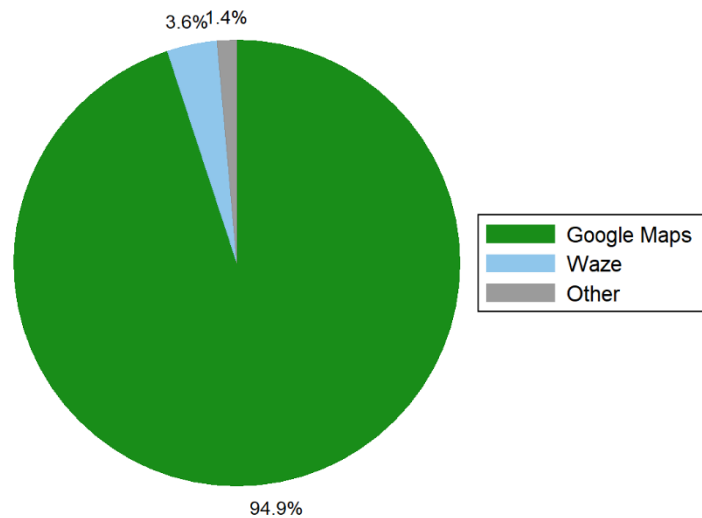
II.124. Since Apple Maps is not available on Android devices, the relevance of Google as a supplier of turn-by-turn navigation apps appears blatant for Android users, as shown in Figure II.14. Google Maps represents the main app in terms of usage (95% in terms of unique users). Waze is instead the second main app used for mapping services (4% share). No other provider seems to play a significant role.

¹³⁰ Please note that the number of unique users for Google Maps and Apple Maps may not be limited to the users of turn-by-turn navigation services, but also of general mapping services such as street views, satellite imagery, directions for non-driving transit (which are instead not available on Waze). This may partially apply also to the other providers shown in Figure II.13 and Figure II.14, and overstate the share of Google Maps, Apple Maps and other providers compared to Waze. In other words, Waze could be a much more relevant provider of turn-by-turn navigation services than it appears from the data collected.

¹³¹ Other navigation apps that were below the Minimum Reporting Standard in January 2015 are, for example: Sygic, Maps.me, TomTom, HERE WeGo, CoPilot, Aponia. However, the inclusion of these applications would not alter significantly the conclusion that Google Maps has remained the most important player.

¹³² One of the very few examples is OsmAnd, a navigation application that uses OpenStreetMap map data, whose content is user generated.

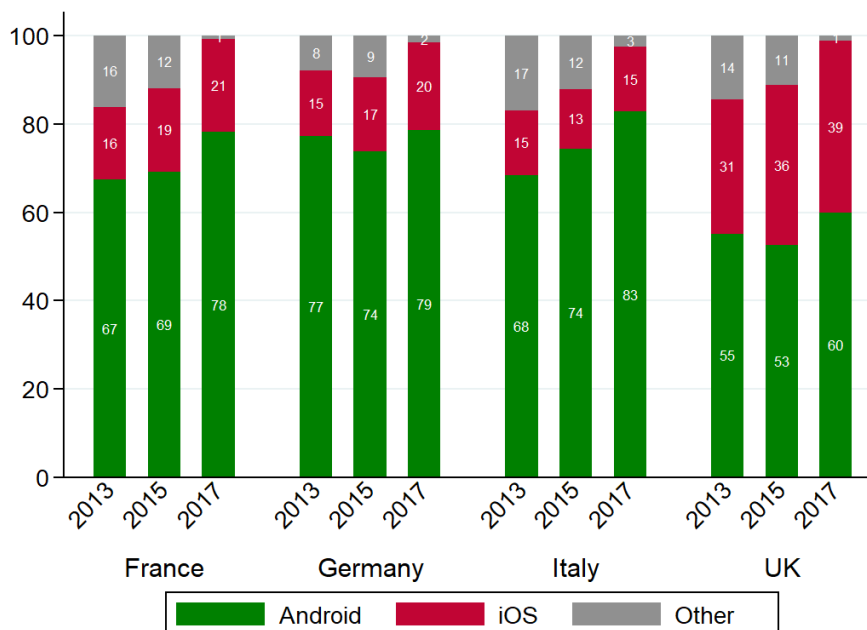
Figure II.14: Share of supply in turn-by-turn navigation apps in Android devices, 2015m1 (% of unique users)



Source: Lear based on ComScore data

II.125. The competitive constraint that Apple Maps exerts on Google Maps is limited by its availability only on iOS devices. Although, as shown in Figure II.15, the share of sales of iOS smartphones has always been higher in UK than in other European countries (31% at the time of the merger and higher in the next years), Apple Maps cannot directly compete with Google Maps for most part of users.

Figure II.15: Share of smartphone sales by operating system (%)



Source: Lear based on eMarketer data (downloaded on February 8, 2019)

II.126. Over the years, the situation observed in the UK market for turn-by-turn navigation apps has not experienced significant changes: Google Maps has remained the main mapping service used, with Apple Maps representing its main competitor – and Waze (now part of Google) being the main alternative for turn-by-turn navigation services for Android users.

II.127. Being Waze part of Google, the market outcome assessment shows there is no other turn-by-turn navigation app able to constrain Google Maps on Android devices. The key question is however whether the decision to clear the merger represented a missed opportunity for the emergence of a competitor. Different counterfactual scenarios can be envisaged:

- Waze could have grown over time, attracted more users and in turn improved its services and the accuracy of its maps;
- Waze could have grown by gaining access to the financial resources of other digital companies interested in its innovative technology;
- Waze could have been acquired by another turn-by-turn navigation service provider such as Apple Maps;
- Waze could have gradually disappeared from the market.

II.128. There are few elements that allow to identify the most likely counterfactual. Whilst other large digital incumbents approached Waze, it seems that they all elected not to acquire it, making the counterfactual represented by alternative transactions somewhat less likely. Most of these tentative acquisitions, however, were contemporaneous to the acquisition by Google, and this may have discouraged alternative buyers.

II.129. Waze proved to have a very innovative technology, and Google itself labelled it as a “brand worth tracking”. This may have allowed it to grow, even in the absence of an alternative buyers. However, while reliance on crowd sourcing enabled Waze to supply accurate and valuable real time traffic information, it may have had some limit when coming to maps’ accuracy or coverage.

II.130. Moreover, the merger has enabled Google Maps and Waze to exploit their complementarities and generate efficiencies. These efficiencies are clearly merger-specific and should be taken into account when assessing whether the decision has proved to be beneficial or detrimental to consumers.

II.131. The evidence gathered on the market evolution is not sufficient to assess which of the above-listed counterfactuals would have been more likely. In any case, the merger assessment would not end up with the selection of the counterfactual, as it would also require to balance the potential anti-competitive harm and the efficiencies generated by the merger.

II.3.2.3 Monetization strategies and the relevance of location data

II.132. As highlighted in section II.3.1, at the time of its decision the OFT did not take into account how the services offered through Google Maps and Waze are monetized. However, monetization channels were already relevant then and have arguably increased in their relevance over time.

II.133. Mapping services can be monetized both directly, through advertising displayed in the navigation apps, and indirectly, by collecting, selling or otherwise exploiting location data. The merger, and the efficiencies that have resulted from it, may have helped both Google Maps and Waze to enlarge their user base, enhance users’ experience and in turn being more attractive for advertisers. While Waze was already monetizing its mapping services, through different forms of local search ads, Google Maps has only started after the merger and may have benefitted from the expertise of Waze.

II.134. Mapping services, however, can also be indirectly monetized. Currently, data on users’ location gathered through mapping services represents a valuable source of information for multiple uses, not limited to advertising. Through mobile devices and the stream of data they generate, location data have become a powerful tool to identify audiences and observe online (and offline) consumer

behaviour. Navigation services are nowadays an important component of mobile use¹³³ and Google Maps is the sixth most important mobile app for UK internet users.¹³⁴

II.135. Location data enables a more precise targeting of consumers' preferences by relying on their movement behaviour¹³⁵, and can hence be used to improve the effectiveness of advertisement. Location-based advertisement has become particularly relevant on mobile devices, as devices' location represents an instant key indicator of users' intent: real-time information on consumers' location allows to build highly personal mobile campaigns by delivering real-time message based on devices' location.¹³⁶ This application has become more and more relevant over time: for example, location targeted mobile advertising is expected to reach \$ 39 billion by 2022 in the US market, an increase of 126% compared to the value of 2017.¹³⁷

II.136. Advertising represents just one of the possible uses of location data, which are indeed also used by companies for other purposes, such as online-to-offline (O2O) measurement (i.e. the use of location data to assess the movements of customers and assess the impact of online advertising), tracking and planning field activities, benchmarking store/location performance.¹³⁸

II.137. Compared to a counterfactual where Waze would have been become a competitive force, the merger might have made Google an even more relevant provider of location data by eliminating a potential competitor in the supply of location data. This in turn might have reinforced its competitive position for the provision of online advertising across all its services.

II.3.3. Conclusions on Google/Waze

II.138. The Authorities' investigation at the time of the merger uncovered that Waze was a promising application in a market where users did not have many alternatives, with a promising business model and growth strategy. Yet, the Authorities were very cautious in the assessment of the evidence before them dismissing the potential competition ToH in part due to uncertainty in future market developments.

II.139. Further, the reliance on Apple Maps as a source of competitive constraints on the merged entity may have been somewhat overstated. If Google were to lower the quality of Google Maps on Android, Android users would not be able to switch to Apple Maps. Apple Maps could constrain Google Maps to the extent that Google cannot discriminate between the two platforms. The Authorities did not investigate whether this was the case, and simply relied on the existence of Apple Maps as a source of competitive constraint. The Authorities could have further investigated the ability of turn-by-turn navigations apps to discriminate across operating system, and the costs users bear to switch from one operating system to another.

II.140. Finally, the Authorities omitted to explore the effects of the merger on the several economic activities related to the provision of turn-by-turn navigation services, which represent the way these services are monetized. This is the result of an insufficient understanding of how the services provided by the merging parties are monetized, both directly and indirectly.

¹³³ For example, a third of smartphone users in the US use navigation apps (report by eMarketer: *"Maps and navigation apps. Discovery, Exploration features open up ad opportunities"*, July 2018).

¹³⁴ eMarketer chart: *"Most Important Mobile Apps Among UK Internet Users, Q2 2017"*, August 2017.

¹³⁵ *"Marketer's Guide to Location Data & Location Based Marketing"*, 16 April 2018. Available at: tamoco.com/blog/marketing-advertising-location-data-intelligence.

¹³⁶ *"How Location Data Is Reshaping Mobile Advertising and Attribution"*, available at: www.jeffbullas.com/location-data.

¹³⁷ Report by eMarketer: *"Location intelligence 2018: consumer behavior, data quality and targeting tips"*, February 2018.

¹³⁸ Report by Local Search Association: *"Market landscape report. Location intelligence"*, February 2018. Available at: www.thelsa.org/Uploads/Public/Documents/FreeReports/2018_Location_Intelligence_Market_Landscape_Report_v2.pdf.

II.141. The market outcome assessment has pointed out the existence of multiple sources of complementarity between the two turn-by-turn navigation apps, which may have been exploited through the merger and contributed to the development the merging parties have witnessed in the years after the merger. However, in terms of choice, there remain few alternatives to the merging parties available to users for turn-by-turn navigation apps, especially for the Android environment. Moreover, the merger may have provided Google with yet another opportunity to reinforce its position in the markets where location data can be exploited, including the advertising markets.

II.142. While there may be some gaps in the analysis undertaken by the Authorities, and that has resulted in the clearance of the merger, it is hard to say whether this has led to a detrimental outcome. This depends on the development that Waze would have witnessed in the absence of the merger, i.e. the selected counterfactual. Even when compared to a counterfactual where Waze would have become a strong competitor, the assessment of the decision should also consider the potentially substantial efficiencies arisen from the merger, that may counterbalance the anti-competitive harm.

II.4. PRICELINE/KAYAK AND EXPEDIA/TRIVAGO

II.143. The OFT's decision of 9 May 2013 allowed Priceline.com Incorporated (Priceline) to complete its acquisition of Kayak Software Corporation (Kayak). Priceline was the holding company of Priceline Group. Priceline's subsidiaries were online travel agencies (OTAs)¹³⁹ that allowed consumers to search and book travel services from travel service providers (TSPs) such as hotels, airlines and car rental companies. Kayak was a meta-search site (MSS) allowing users to search and compare prices for hotel rooms, airline tickets, rental cars and other travel services. The crucial difference between the parties' businesses was that MSSs did not have a booking functionality; rather, they referred users either to OTAs' or TSPs' websites, where users could complete their booking.

II.144. MSSs often offer a so-called "facilitated booking" functionality: that is, consumers are given the chance to complete the booking on the MSS interface, instead of being referred to an OTA or TSP website. However, these bookings are completed through an affiliate service provided by an OTA and this is clearly signalled to consumers on the MSS website and the financial arrangements between OTAs and MSSs remain unchanged. At the time of the merger, Kayak offered this service through its "Book Kayak" functionality. This could be a factor increasing substitutability between the parties' services. However, the OFT noted that only an insignificant number of bookings were made through "Book Kayak".

II.145. OTAs are two-sided platforms as they supply online travel search services to consumers on one side, and online advertising services to TSPs on the other; moreover, OTAs operate as intermediaries in the transactions occurring between consumers that buy travel services and the TSPs that sell them; OTAs receive a commission from TSPs if customers conclude a booking on their website. MSSs are also two-sided platforms, but they do not act as intermediaries between customers on one side, and TSPs or OTAs on the other as they facilitate the transaction between consumers and the other parties but do not enter into a transaction with the buyer. MSSs receive a rate per click by OTAs or a percentage commission of the booking fee by TSPs if customers make a booking on their website.

II.146. According to the OFT, from the perspective of TSPs, the substitutability between OTAs and MSSs might have been limited since, in order to make direct use of an MSS, a TSP needed to have its own booking functionality. On the other hand, it was not clear to what extent consumers found the distinction between OTAs and MSSs important. The Authorities did not conclude on the precise relevant market definition, but on a cautious basis they assessed the transaction with reference to: (i) online advertising services to UK-based hotels and car hire firms by OTAs and MSSs in the UK; and (ii) online travel search services for UK-based consumers relating to hotels and car hire by OTAs and MSSs in the UK.

II.147. The OFT noted that the parties both competed and had a vertical relationship. In particular, the non-horizontal relationship between OTAs and MSSs may be characterized as MSSs providing advertising services to OTAs. Therefore, the Authorities investigated both horizontal and non-horizontal ToHs.

II.148. The transaction whereby Expedia, an OTA, acquired control of Trivago, an MSS, in March 2013 was not assessed by the Authorities as the transaction did not meet the UK turnover test nor the share of supply test. There is thus limited scope for a methodology assessment of the decision, since this does not include any substantive assessment of the merger. However, the transaction will be discussed in the context of the market outcome assessment, jointly with *Priceline/Kayak*, as the two mergers affected the same relevant markets.

¹³⁹ The Priceline Group operated under four main brands: Booking.com, Priceline.com, Agoda.com and Rentalcars.com.

II.4.1. Methodology assessment

II.4.1.1 Identification of ToHs pursued by the Authorities and key elements underpinning them

Unilateral effects in the UK online hotel sector

II.149. The Authorities were concerned that the transaction could lead to price increases or degradation of quality in the supply of online advertising services by OTAs and MSSs to hotels, and/or degradation of quality in the supply of online travel search services to consumers. The OFT estimated the parties' market shares based on three figures: net revenue, volume and gross booking value (GBV). The assessment of the likelihood of these effects was conducted separately for the two sides of the market, but with similar considerations, therefore they will be discussed jointly. The key evidence that made the OFT dismiss this ToH was the following:

- the increment in market share brought about by the transaction was minimal due to Kayak's small share of supply at the time of the merger;
- there existed more significant competitors to both parties. In particular, the closest competitors to Priceline were generally identified by third parties in other OTAs, such as Expedia and Travelocity, and the closest competitors to Kayak were identified in other MSSs, such as Trivago and TravelSupermarket.

Unilateral effects in the UK online car hire sector

II.150. The Authorities were concerned that the transaction could lead to price increases or degradation of quality in the supply of online advertising services by OTAs and MSSs to car hire firms, and/or degradation of quality in the supply of online travel search services to consumers. Unlike for the hotels sector, the OFT was unable to estimate market shares. This ToH, however, was dismissed mainly based on the argument that the increment in revenues generated by the transaction was very small due to Kayak's revenue from car hire being negligible. Also, the Authorities noted that the car hire firms they contacted did not raise concerns about the merger.

Coordinated effects in the UK online hotel sector

II.151. The relevant question the Authorities had to address was whether the conditions for coordination were strengthened as a result of the transaction. The concern in this case was that Priceline could use Kayak's technology to automate detection of rate parity¹⁴⁰ deviations, thus making coordination easier. The key argument on which the dismissal of this ToH was based was that more effective technology for parity checks already existed in the market and was available to Priceline, for instance data scraping technology. This technology would have been better suited than Kayak's for the purpose of detecting parity deviations, as the latter had an important limitation: Kayak would have only provided Priceline with access to pricing information related to the searches carried out by its customers, instead of a full set of an OTA or TSP's prices. Indeed, the parties informed the Authorities that Kayak did not store its counterparties' pricing data on its own systems; rather, when a consumer enters a search into Kayak, the same search is automatically run on various OTAs and TSPs price databases.

Foreclosure of rival OTAs

II.152. The Authorities assessed whether the merger would have provided Priceline with the opportunity to foreclose rivals from both online travel search services to consumers and online

¹⁴⁰ Rate parity agreements are agreements between hotels and OTAs providing that the same rates are charged for the same room on all distribution channels; hotels are therefore prevented from offering their rooms at lower prices on other websites, including their own website.

advertising services to TSPs using Kayak to bias search results in its favour. The Authorities rejected this ToH claiming that:

- even if Priceline had the technical ability to pursue such a strategy, evidence on consumers' behaviour, in particular the fact that they seemed to visit at least three websites when comparing and choosing travel products, suggested that they would have quickly noticed such a biased picture and Kayak's usage would have declined;
- Kayak's business could have been further damaged as other OTAs would have stopped using Kayak. This implies that the economic incentive to foreclose was likely missing: losses would have likely outweighed gains, particularly given the minimal size of Kayak's share of supply;
- even if implemented, such a foreclosing strategy would have been unlikely to lead to an SLC since Kayak was not a "must have" website for other OTAs to generate traffic to their website. There were several MSSs available to UK consumers and MSSs represent only one of the possible sources of traffic for OTAs.

Conglomerate effects of Priceline bundling or tying its other portfolio brands

II.153. The concern was that, given the merging parties' increased market share in the hotel sector, Priceline could use Kayak to leverage its other brands through bundling or tying in order to force counterparties to sign up to one or more other Priceline brands. The OFT concluded that this was not a credible ToH based on the following pieces of evidence:

- given the small increment in Priceline's market share brought about by the transaction, the merger did not result in additional leverage with TSPs;
- the majority of Kayak's customers were OTAs with whom there is no opportunity of bundling or tying;
- TSPs were already signing up to multiple OTAs and MSSs.

II.4.1.2 Analysis of the key elements underpinning ToHs

Unilateral effects in the UK online hotel sector

II.154. The dismissal of the unilateral effects in the hotel segment ToH rested on:

- the observation that the increment in market share brought about by the transaction was minimal due to Kayak's small share of supply at the time of the merger;
- the existence of other, more significant competitors to both merging parties in the provision of both services.

II.155. However, more fundamentally, the relevance of horizontal ToHs rests on whether consumers, or at least a subset of them, perceive the services supplied by MSSs and OTAs as substitutes, as only in this case unilateral effects may have arisen as a result of the transaction. This fundamental question is effectively left open in the Authorities' decision, with evidence going both ways:

- on the one hand, MSSs and OTAs have very different business models. OTAs allow users to book directly on their websites, provide customer care, and collect their revenues from TSPs. MSSs only allow users to search and compare the offers of different OTAs for the same TSP, as well as offers for different TSPs, and collect their revenues from both OTAs and TSPs;
- on the other hand, there is some overlap in the range of services supplied by MSSs and OTAs, in that both enable consumers to compare the offers of the various TSPs available for a given request. There was also some evidence of convergence in business models, such as the provision by MSSs of facilitated bookings, which increased the overlap between the range of services supplied by MSSs and OTAs. The availability of booking facilities by TSPs also contributed to making the two services substitutes.

II.156. The Authorities approach was to skip this assessment and go straight to evaluating whether the acquisition of Kayak substantially increased Priceline’s share of supply. However, the market share analysis as carried out by the Authorities is likely to be affected by a significant measurement problem. Indeed, even if users, or a subset thereof, perceived OTAs and MSSs as substitutes, as both enable them to search and compare offers of TSPs, the range of services they supply would remain different. This difference entails that OTAs’ costs are substantially larger, as are the commissions typically charged to TSPs. This makes revenues difficult to compare across the two types of services. Hence, Kayak’s small share of the market in terms of revenue may not have corresponded to a likewise minor role vis-à-vis consumers.

II.157. The Authorities could have investigated the nature of the relationship between MSSs and OTAs more thoroughly by simply analysing how users of these services behave. For instance, how common is it for users to use an MSS and then move on to book with the facilitated booking facility or with the TSP itself? How many users, instead, perform their search on MSS and then proceed to book with an OTA? How many users go to an OTA’s website directly? All of these questions – relevant to evaluating the nature of the relationship between OTAs and MSSs – could have been answered through a survey or through analysis of traffic data showing points of entry to the OTAs’ websites. Such data is routinely collected by OTAs and MSSs to monitor performance and the Authorities could have requested it from the merging parties.

II.158. In any case, even if the Authorities had found that OTAs and MSSs could be regarded as substitutes, it is likely that Kayak and Priceline were not close substitutes of one another. It is reasonable to argue that OTAs compete more closely with other OTAs and that MSSs compete more closely with other MSSs, thereby making the conclusion reached by the Authorities substantially correct regardless of the extent of substitutability between the two types of services and of the measurement problems discussed above.

Unilateral effects in the UK online car hire sector

II.159. The Authorities’ assessment of this ToH was similar to the one carried out for the hotel sector, therefore relying on revenue evidence and on the assumption that MSSs and OTAs are not each other’s closest competitors. Revenue evidence is likely biased by the same issues described above, but the closeness of competition argument appears robust.

Coordinated effects in the UK online hotel sector

II.160. The dismissal of the coordinated effects in the hotel segment ToH rested on:

- the observation that the technology offered by Kayak was not an effective detection mechanism; and
- the existence of alternative technologies that could have better served the same purpose pre-merger.

II.161. The OFT’s arguments seem convincing since the available evidence suggested that the transaction was not likely to strengthen market participants’ incentives to coordinate.

Foreclosure of rival OTAs

II.162. The dismissal of the foreclosure ToH rested on the following key arguments:

- consumers would have quickly noticed a bias in Kayak’s search results;
- losses would have likely outweighed gains to the merged entity, particularly given the minimal size of Kayak’s share of supply;
- even if implemented, such a foreclosing strategy would have been unlikely to lead to an SLC since Kayak was not a “must have” website for other OTAs to generate traffic to their website.

II.163. The dismissal of this ToH hinged *inter alia* on the ability of users to promptly recognize bias in search results and switch away from a Kayak website favouring Priceline’s offers. The only evidence that supported this argument was consumers’ tendency to multi-home, and in particular the fact that they visited at least three websites when comparing and choosing travel products. However, this argument does not seem compelling for the following reasons:

- the Authorities did not investigate which types of websites are visited by consumers, i.e. whether they compare travel services among MSSs only or also across OTAs and TSPs’ websites: this might have an influence on their ability to notice the possibly biased picture provided by Kayak. The only way for consumers to be able to recognize bias would have been for them to compare the results of different MSSs, as only these allow to compare offers of OTAs and TSPs for a given travel service. Consulting TSPs’ or OTAs’ websites does not add to their ability to recognize bias in favour of a particular OTA;
- there is evidence that consumers tend to focus their attention, and clicks, on results at the top of search results pages, in particular for travel websites. De Los Santos and Koulayev (2012) analysed consumers’ propensity to click on different links using a sample of 23,959 unique search histories on listings from a travel and accommodation website and found that the top three links accounted for 44% of the total clicks, with 22% being concentrated on the very first link. In addition, their study reveals that the first links on any page obtained more clicks than the last link on the previous page: this suggests that consumers may tend to click on certain links just because they are on top of the list rather than because they expect them to be more relevant to their searches;¹⁴¹
- the OFT did not consider that the average consumer is likely to be unaware of the brands that are under the control of the same entity: it is therefore hard to imagine that consumers would realise that Kayak is favouring Priceline’s offerings, if they do not even know that they are part of the same group;
- different OTAs return different recommendations for the same queries, with some prioritising price and other prioritising quality:¹⁴² therefore, it is harder for consumers to notice a bias in search results by simply visiting multiple websites.

II.164. Thus, the OFT’s conclusion about the incentives of the merging parties to bias search results in favour of other brands from the Priceline group is not conclusively supported by the evidence collected during the merger assessment. However, the link between such a practice and the foreclosure of rival OTAs is not at all direct: there were several MSSs active in the UK, and the competitive impact of a bias was in any case likely to be limited.

Conglomerate effects of Priceline bundling or tying its other portfolio brands

II.165. The arguments used by the OFT for rejecting the conglomerate effects ToH are overall convincing. Indeed, it is reasonable to assume that Kayak did not provide incremental leverage with TSPs given that the majority of its customers were OTAs, and that, in any event, this practice would have been unlikely to produce a significant effect on competition given that it was already quite common for TSPs to multi-home, i.e. sign up to multiple OTAs and MSSs.

II.4.1.3 Analysis of completeness of ToHs pursued

II.166. Had the Authorities found that the prevalent relationship between OTAs and MSSs was of a horizontal nature, i.e. that OTAs and MSSs are substitutable from the perspective of consumers, then an additional ToH that could have been explored was whether the combination of Priceline’s and

¹⁴¹ For further details see the CMA’s report “Online search: consumer and firm behaviour” (2017).

¹⁴² See paragraph 5.19 in CMA’s report “Online search: consumer and firm behaviour” (2017).

Kayak's user bases could have created an exclusive set of users who only shop through these services and that could have been leveraged to exert market power on the other side of the market.

II.167. Similarly to what is discussed in section II.2.1.3 in relation to social media platforms, the attractiveness of OTAs and MSSs to TSPs depends, *inter alia*, on the user bases these platforms allow TSPs to reach. If platforms had an exclusive turf of users, this would increase their ability to exert market power with TSPs, in line with the literature about competitive bottlenecks discussed in section I.2.1 and in Annex A.1.2, where single-homing on one side allowed platforms to extract monopoly rents on the other side. In the benchmark model, it is assumed that one set of users of the platform multi-home and the other always single-home.

II.168. Whilst such an assumption is quite extreme and does not fully reflect the dynamics of the online travel markets, the conclusion might still provide useful insights. Available evidence suggests that TSPs (and OTAs) multi-home, being present on multiple platforms, and that users do so to a lesser extent; several empirical studies suggest that consumers, when searching for travel services online, seem to compare fewer options than might be expected.¹⁴³ The price structure prevailing in the sector is consistent with what suggested by the literature, with users accessing these services for free and TSPs paying commissions to OTAs and MSSs, meaning that platforms seek to attract users which are leveraged on the other side of the market.

II.169. In this context, and to the extent that MSSs and OTAs are substitutable to one another (which, as discussed in section II.4.1.2 above, was effectively an open question at the time of the merger) an additional ToH which could have been explored was whether the user bases of Priceline and Kayak were such that their combination created a sizable share of users shopping only through these two suppliers, which would have become exclusive to the merged entity post-merger. The transaction could have then given the merged entity the ability to charge higher prices to TSPs and other OTAs to give access to this exclusive user base. As will be discussed in section II.4.2, however, the available evidence points to a complementary relationship between OTAs and MSSs.

II.170. In addition, the Authorities could have explored whether the business models of Booking and Kayak were likely to converge in the future, with Kayak taking steps to increase the degree of substitutability between its services and those provided by OTAs. Indeed, the introduction of facilitated booking was a step in that direction. To explore this ToH, the Authorities could have assessed Kayak's internal documents to evaluate whether there was any plan to do so. However, there were probably other competitors left in the market likely to constrain Priceline more than Kayak could.

II.4.2. Market outcome assessment

II.171. The market outcome assessment of the two mergers in the online travel sector, *Priceline/Kayak* and *Expedia/Trivago*, looks at:

- the relationship between the services offered by OTAs and MSSs, and the extent to which they can be considered substitutes or complements (section II.4.2.1);
- how the market and the merging parties have evolved since the mergers took place (section II.4.2.2);
- whether the mergers provided an incentive for Kayak and Trivago to bias their search results in favour of Priceline's and Expedia's offers respectively (section II.4.2.3).

¹⁴³ In particular, Johnson et al. (2004) found that searched on average 1.8 travel websites; Zhang et al. (2007) documented a higher degree of multi-homing by consumers, with 3.3 travel websites being visited on average; Holland and Jacobs (2014) found that only 26% of consumers consulted more than one airline website before their purchase, and the average number of airline websites visited among those consumers who browsed through more than one was just 2.46. For further details see the CMA's report "Online search: consumer and firm behaviour" (2017).

II.4.2.1 The relationship between OTAs and MSSs

II.172. As described in section II.4.1, OTAs allow consumers to search and book travel services from TSPs such as hotels, airlines and car rental companies. MSSs are instead platforms that allow consumers to search and compare prices for hotels, airline tickets, rental cars and other travel services offered by different OTAs and TSPs. The relationship between OTAs and MSSs is not straightforward: there is complementarity between their services since MSSs do not usually offer booking functionalities but refer the customer to the selected OTA. However, there may be some substitutability between the two services, to the extent that both enable consumers to compare the offers of the various TSPs available for a given request.

II.173. The evidence collected through the market participants¹⁴⁴ seem to suggest the prevalence of a complementary relationship between OTAs and MSSs.

II.174. First, MSSs and OTAs derive the bulk of their revenues in different ways. MSSs' revenues largely come from the traffic referred to the OTAs. Generally, MSSs monetize through cost per click (CPC) and cost per acquisition (CPA). The CPC arrangement requires the OTA/TSP to pay the MSS whenever a referral to the OTA/TSP website is made, regardless of whether the click leads to a booking.¹⁴⁵ The CPA arrangement, instead, entails that the OTA/TSP pays a fixed fee or a percentage of the booking commission when a booking is made by a customer that was referred to its website from the MSS.¹⁴⁶

II.175. OTAs' revenues, instead, are completely generated from TSPs. Revenues are indeed mainly given by the booking commissions paid by the TSPs, when customers conclude a booking through the OTA website.¹⁴⁷ This revenue model is the one employed, for example, by Booking.com, Priceline's main website.¹⁴⁸ Other OTAs, such as Expedia, earn most of their revenues by buying the service from TSPs and then reselling it to customers. The OTA is able to get discounts on the services, such as rooms or flights, by buying them in advance and in bulk, and often offering them to customers in the form of a bundle between different travel services.¹⁴⁹

II.176. Second, market participants define OTAs and TSPs as the main customers of MSSs, and MSSs as an important distribution channel for the services provided by OTAs and TSPs (for some OTAs, MSSs are their major distribution channel).¹⁵⁰ In this perspective, OTAs compete with each other – and with TSPs – to be shown in the MSSs' results page and gain traffic towards their websites.

II.177. Market data also seems to point towards the direction of complementarity. Table II.1 shows the top three referring sites for OTAs, which are always MSSs. That is, the main source of traffic for OTAs is represented by links from MSSs to OTAs.

Table II.1: Top three referring sites for various OTAs

Sites	Top three referring sites
Expedia.co.uk	Tripadvisor.co.uk
	Trivago.co.uk
	Kayak.co.uk

¹⁴⁴ This is based on interviews held with an MSS and eDreams Odigeo.

¹⁴⁵ The cost of the click is usually determined through an auction system.

¹⁴⁶ In addition, MSSs derive part of their revenues from standard advertisement, mainly in the form of banner ads in their websites.

¹⁴⁷ The commissions depend on the types of accommodation and how the TSP wants to rank on the result pages.

¹⁴⁸ <https://www.booking.com/content/terms.en-gb.html>.

¹⁴⁹ <https://www.innovationtactics.com/business-models-tripadvisor-booking-com-expedia/>.

¹⁵⁰ This is based on interviews held with an MSS and eDreams Odigeo.

	Trivago.co.uk
Uk.hotels.com	Tripadvisor.co.uk Kayak.co.uk
	Skyscanner.net
Edreams.co.uk	Kayak.co.uk Cheapflights.co.uk
	Cheapflights.co.uk
Opodo.co.uk	Kayak.co.uk Momondo.co.uk
	Kayak.co.uk
Ebookers.com	Tripadvisor.co.uk Trivago.co.uk
	Tripadvisor.co.uk
Travelrepublic.co.uk	Trivago.co.uk Travelsupermarket.com

Source: SimilarWeb, February 2019

II.178. However, facilitated booking agreements between OTAs and MSSs may enhance the substitutability between the services provided by OTAs and MSSs. When relying on a facilitated booking agreement with an OTA, the MSS offers consumers the possibility to proceed with the booking directly on its website. The booking services and the customer care services will be still provided by an OTA, but the consumer will not be referred to the OTA website. In most respects, from the perspective of consumers, the booking service will be supplied by the MSS, with no need for the OTA's intermediation.

II.179. For example, Kayak has facilitated booking agreements with several OTAs in the UK, ranging from Expedia brands to Priceline brands, and to other independent OTAs.¹⁵¹ According to data collected from Kayak on the hotel segment for a sample of destinations¹⁵², the option to book an accommodation directly through Kayak, i.e. using its facilitated booking agreements with OTAs, is available in 97% of cases: for almost every hotel listed in the results page, users have the option to book the accommodation by using the MSS's website instead of be referred to the OTAs'. It should be however considered that the provision of facilitated booking service does not seem very widespread among MSSs in the UK market. Among the largest MSSs¹⁵³, other than Kayak, only TripAdvisor provides such service.

II.180. In addition, as also noted by the OFT during the investigation, the possible horizontal relationship between OTAs and MSSs arises since MSSs may channel users' traffic directly towards TSPs (those with booking functionalities), preventing users to flow to OTAs' websites and avoiding their intermediation. For instance, data collected on Kayak's website shows that the option to book an accommodation directly through the TSP is available in 41% of cases. In all these cases, consumers can

¹⁵¹ Based on a call held with Kayak, the OTAs providing facilitated booking to Kayak are Hotels.com, Expedia, Amoma, Booking.com, Getaroom and Agoda.

¹⁵² Kayak has provided information on the results obtained for a number of queries made in their website for hotel accommodation. In particular, Kayak has collected information for search results obtained for 49 destinations and, for each destination, the first 15 hotels appearing on the search results page have been considered. Annex D describes how data analyzed in this section was collected and elaborated.

¹⁵³ See Section II.4.2.2.

substitute the service provided by the OTA with the service provided by Kayak in conjunction with the TSP.

II.181. The evidence above may not be enough to conclude that OTAs and MSSs are substitute, but may contribute in making the distinction from the users' perspective more blurred. When asked whether facilitated booking agreements can alter the complementary relationship between OTAs and MSSs¹⁵⁴, the stakeholders interviewed stressed that facilitated bookings only represent an additional point of sales for OTAs. Moreover, even in the case of facilitated booking, MSSs still monetize through the standard financial arrangements with OTAs (CPC or CPA). One of the interviewed stakeholders¹⁵⁵ pointed out that the facilitated booking function has been introduced to reduce friction in users experience, especially when users make the booking from their mobile devices, and to raise brand loyalty. For example, through facilitated booking users can use credit card information previously saved on the MSS.

II.182. On balance, however, most of the elements collected suggest the existence of a vertical relationship between OTAs and MSS. The assessment of the market structure arising after the merger will thus focus on whether and to what extent the acquisition of an input such as the services provided by the MSSs has enhanced the growth of Priceline and Expedia in the years after the merger.

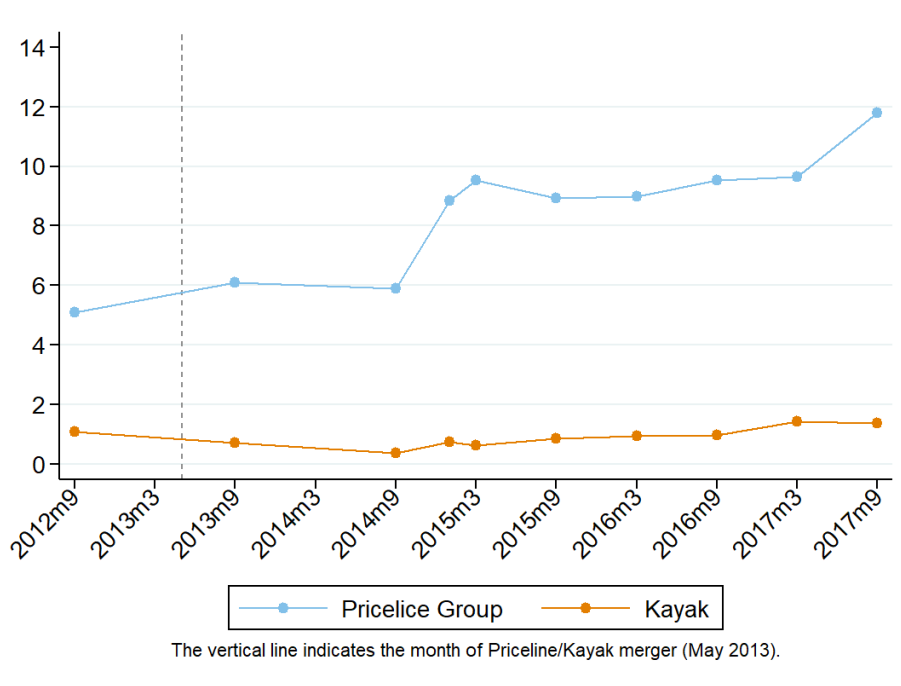
II.4.2.2 The evolution of the merging parties in the markets for travel services

II.183. Figure II.16 shows the number of monthly users in the UK for Priceline and Kayak before and after the years of the merger (the number of Priceline users includes the users of all its travel websites, excluding Kayak). Priceline users have increased over time, going from 5 million in September 2012 to 11.8 million in September 2017. This growth is mainly driven by the Booking.com brand. Kayak users have instead remained stable over the entire period, reaching the level of 1.4 million in September 2017.

¹⁵⁴ This is based on interviews held with Kayak and eDreams Odigeo.

¹⁵⁵ This is based on the interviews with Kayak.

Figure II.16: Monthly active users of Priceline group and Kayak in the UK (million)¹⁵⁶



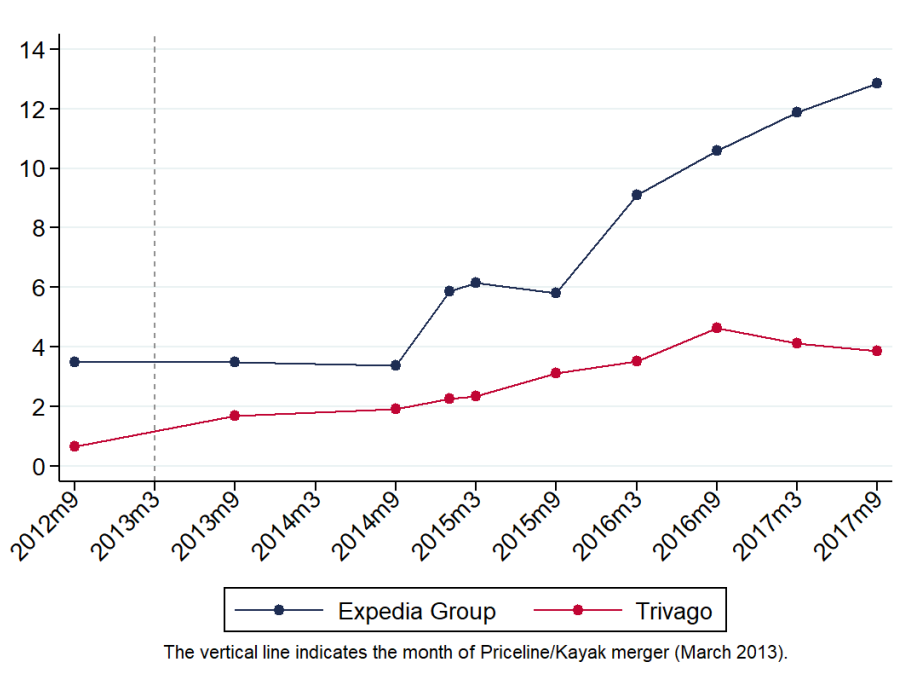
Source: Lear based on ComScore data

II.184. The evolution of the number of users of Expedia (which includes the users of all its websites, excluding Trivago) and Trivago is shown in Figure II.17. The number of users of Expedia has witnessed a consistent growth starting from the end of 2015, reaching 12.8 million users in September 2017. This growth was mainly driven by the Expedia.com brand and the Hotels.com/Venere.com brand.¹⁵⁷ Trivago’s visitors have also increased since the time of the mergers, going from 0.7 million in September 2012 to 3.9 million in September 2017.

¹⁵⁶ Starting from 2015, ComScore has changed the methodology employed to measure mobile activities, transitioning from GSMA MMM to Mobile Metrix, in order to take into account more properly the usage deriving from mobile devices (www.comscore.com/Insights/Blog/From-GSMA-MMM-to-Mobile-Metrix). Total Digital Population estimates available in MMX Multi-Platform have been impacted reflecting various factors such as different definition of reportable universe for Mobile data and different scope of reported devices for Mobile data. Due to this transition, a direct comparison between December 2014 and January 2015 MMX Multi-Platform UK data is not recommended by ComScore: the increase in the number of users observed between September 2014 and January 2015 may be due to the change in methodology rather than to a real increase in the platforms’ users.

¹⁵⁷ Expedia Group acquired Venere.com in 2008 and fully incorporated it into Hotels.com in 2016.

Figure II.17: Monthly active users of Expedia group and Trivago in the UK (million)



Source: Lear based on ComScore data

II.185. Several factors, other than the mergers, may explain the increasing traffic registered by the Priceline and Expedia groups.

II.186. First, Expedia and Priceline made several acquisitions throughout the period 2012-2018. For example, the growth experienced in Priceline users in 2017 may be explained by the acquisition of Momondo (MSS) and Cheapflights (MSS). Instead, during the period analysed Expedia has acquired Travelocity (OTA), HomeAway (OTA), Ebookers (OTA) and Orbitz (OTA).

II.187. Second, there is a general increase in the use of online channels to search and book travel services, at the expense of offline channels. The digital travel Booker penetration in the UK, measured as the percentage of internet users that have booked travel or accommodation online in the past year, has constantly increased over time, reaching 55% of the Internet users in 2016, one of the highest percentages in Europe.¹⁵⁸ The share of gross booking value (GBV) generated through offline channels has gradually decreased, moving from 48% in 2011 to 38% in 2017, to the advantage of the online channels.¹⁵⁹

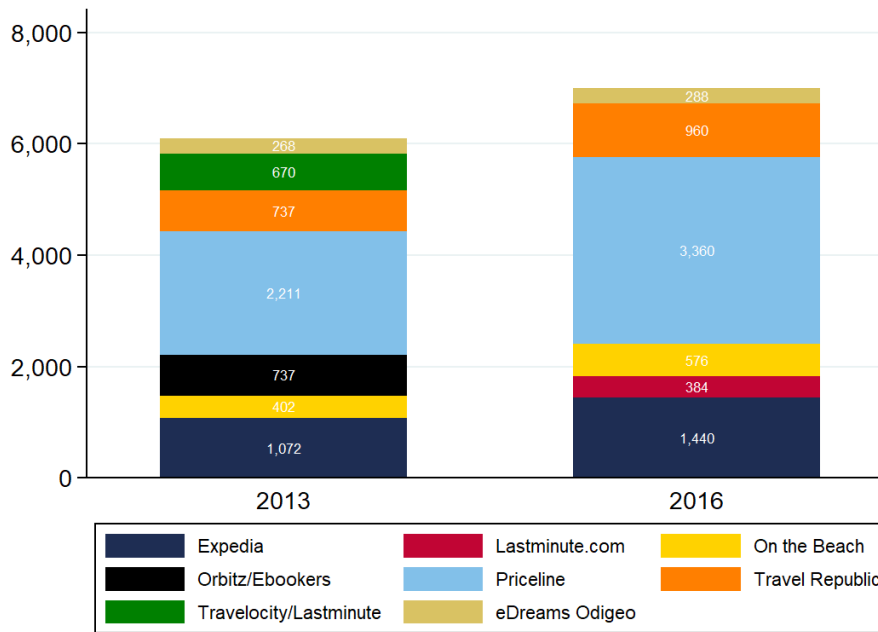
II.188. When compared to other OTAs, those in the Priceline and Expedia groups seem to be the largest. Figure II.18 shows the GBV of Priceline, Expedia and the largest OTAs in the UK market.¹⁶⁰

¹⁵⁸ Report by eMarketer: "Global digital travel platforms 2017. A country-by-country review of the top travel sites", December 2017.

¹⁵⁹ PhocusWright reports.

¹⁶⁰ Data is based on PhocusWright reports. The GBV is calculated as the total transaction value of the (UK and non-UK) products sold in the UK for leisure and managed business travel, and, as such, refers mainly to OTAs' products. As to the hotels and the car hire firms, data includes the booking value generated by UK-based TSPs and does not include the value generated when UK-based consumers book services from TSPs located outside the UK.

Figure II.18: UK online travel agencies gross booking value (million GBP)



Source: Lear based on PhocusWright reports

II.189. Priceline appears to be the largest OTA in terms of GBV, and the gap with other operators has increased over time. Expedia is the second largest operator and its GBV is significantly smaller than Priceline’s GBV. Other OTAs, On the Beach and Travel Republic, have also grown between 2013 and 2016.

II.190. Data on GBV should be interpreted with caution. OTAs may indeed operate in different travel services, whose booking value may be different.¹⁶¹ Moreover, the penetration of OTAs, compared to TSPs, may be different across travel segment. Data suggests that OTAs penetration is higher in the hotel segment.¹⁶² This may also explain why Priceline’s GBV is higher than Expedia, although their number of users is comparable (as shown in Figure II.16 and in Figure II.17). Indeed, Priceline brands mainly deal with hotel bookings, while Expedia is a full-service group, active also in car rentals and flights.

II.191. The above data seems to indicate that there exist different OTA groups that provide online travel services through several brands, thus offering consumers a variety of choices. Above all, Priceline and, to a lesser extent, Expedia seem to hold a significant position as OTAs, and their positions have reinforced over time.

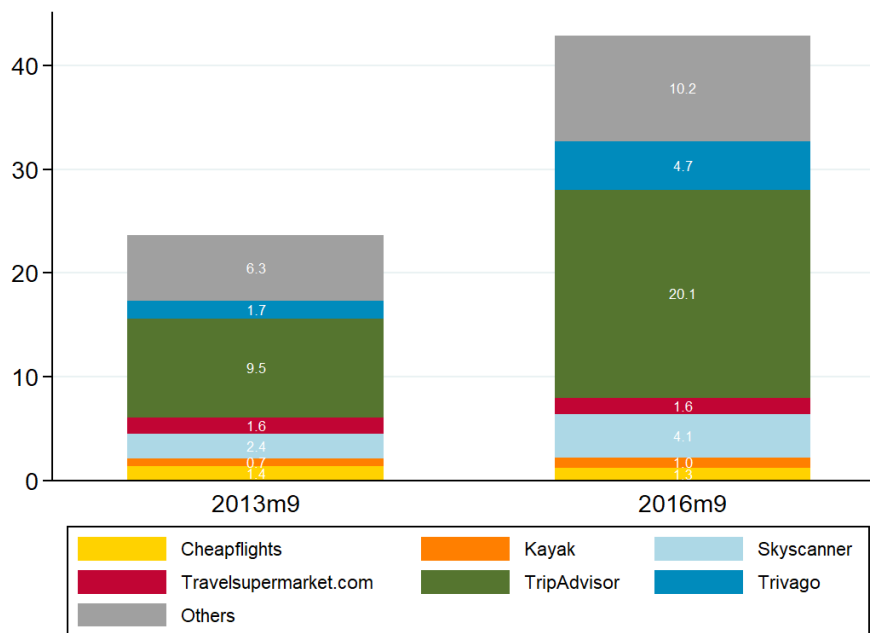
II.192. Similar conclusions can be drawn when looking at the MSSs. Figure II.19 shows the main MSS in the UK market, including Kayak and Trivago¹⁶³, in September 2013 and in September 2016. Since the GBV is not a useful metric to compare MSSs’ size, the number of monthly users has been considered.

¹⁶¹ PhocusWright estimates that, in 2013, the value of online gross booking in the flight segment was £ 9.4 billion; in the rental cars segment it was £ 0.3 billion; in the hotel segment it was £ 1.5 billion; and in the rail segment it was £ 0.9 billion. In 2016, the online gross booking value was £ 12.7 billion for flights, £ 1.0 billion for rental cars, £ 5.3 billion for hotels, £ 2.2 billion for rail.

¹⁶² PhocusWright estimates that, in 2013, 21% of the gross booking value generated by the hotels has accrued through the OTAs, while 15% was generated by the TSPs’ websites. The GBV of OTAs reached the 27% of the total GBV related to the hotels in 2016.

¹⁶³ Based on the number of users on 2017.

Figure II.19: Monthly active users of MSSs in the UK (million)¹⁶⁴



Source: Lear based on ComScore data

II.193. The traffic towards MSSs’ websites has increased over time, and all the MSSs have experienced a growth in the number of users, showing their growing importance for online travel services. Customers are increasingly relying on their services to compare offers before booking a travel service: in 2015, MSSs have become the second most used source of information, after only family and friends, for researching a trip.¹⁶⁵ Although the number of MSSs visited by UK users has diminished¹⁶⁶, there is still a large range of choices for consumers.

II.194. TripAdvisor seems to be the largest MSS in terms of users; however, this figure includes also consumers that use TripAdvisor only for reading and leaving reviews: the number of users consulting TripAdvisor for its MSS’s functionalities may therefore be smaller. Trivago and Skyscanner appear to be the largest MSSs after TripAdvisor, and they have both experienced a significant growth in the number of users between 2013 and 2016. Kayak is instead a relatively small MSS and, as the other platforms of comparable size (Cheapflights and Travelsupermarket.com), has not significantly grown over time.

II.195. OTAs have realized the importance of MSSs and the role they play in channelling traffic to their websites. In recent years, many MSSs have been acquired by groups offering online travel services. For instance:

- other than Kayak, Priceline has acquired Momondo, Cheapflights, Mundi and HotelsCombined;¹⁶⁷

¹⁶⁴ The category “Others” includes 60 MSSs in 2013 and 33 MSSs in 2016.

¹⁶⁵ “The future on metasearch 2015: strategize for the metasearch age”. Report by Eye For Travel, available at: www.eyefortravel.com/sites/default/files/1570_eft_metasearch_report_v6.pdf. The report shows also that the annual revenue for the main MSSs (Trivago, TripAdvisor, Skyscanner) has significantly increased in 2015, compared to the previous year.

¹⁶⁶ From 66 to 39 MSSs, according to ComScore data.

¹⁶⁷ Other than acquiring Trivago, Expedia has consolidated its position by acquiring other OTAs such as Orbitz, HomeAway and Travelocity.

- eDreams Odigeo has acquired the MSS Liligo;
- Skyscanner has been acquired by Ctrip, a Chinese provider of travel services.

II.196. The acquisition of Kayak and Trivago may have had their rationale in supporting Priceline’s and Expedia’s respective growth strategies. On the one hand, Priceline’s main business is in the hotel segment, whereas the main focus of the MSSs that it has acquired is on flights: the transaction may have reflected Priceline’s will to expand in the flights segment. On the other hand, Expedia was focused on hotels, as was Trivago, but Expedia’s growth strategy was that of focusing on hotels even further, as these were considered the most profitable across its product lines.¹⁶⁸ One way for the acquisitions to support such plans could have been that of biasing Kayak’s and Trivago’s search results towards Priceline and Expedia respectively, so as to increase their traffic. Whether this has occurred will be explored in section II.4.2.3.

II.4.2.3 Intermediation bias in the MSSs’ search results

II.197. As extensively discussed in the economic literature (see section A.1.1 for a review), platforms may have the incentive to use their technology to “direct” user interactions towards particular results rather than others in exchange for, for example, higher revenues per interaction (so-called “intermediation bias”). Vertical integration may have led to intra-group bias: the mergers may have given Kayak and Trivago the incentive to bias search results to favour, respectively, Priceline and Expedia travel offers over the offers made by other OTAs. As discussed in section II.4.1.1, this ToH was also investigated (and dismissed) by the OFT at the time of the *Priceline/Kayak* merger.

II.198. The intermediation bias may have been realized by showing Priceline brands and Expedia brands offers in a favourable position in the Kayak and Trivago search results page. When searching for an accommodation on Kayak and Trivago websites, consumers can make their choice among different hotels and booking options. For each hotel, the available booking options may be displayed in different positions, and in particular:

- in the “View Deal” position, which can be considered the most favourable position in their results page. The “View Deal” offer is indeed the prominent booking option suggested by the MSSs;
- in the search results page below the “View Deal” position;
- by clicking on the “More sites” options. These results are not directly visible in the search results page, and consumers may end up not noticing such offers.

II.199. In order to investigate whether the mergers may have led to intra-group bias, we have looked at how results are shown on Kayak and Trivago when queries related to the hotel segment¹⁶⁹ are made, and in particular which OTAs/TSPs appear more frequently in the most favourable positions in the results page.

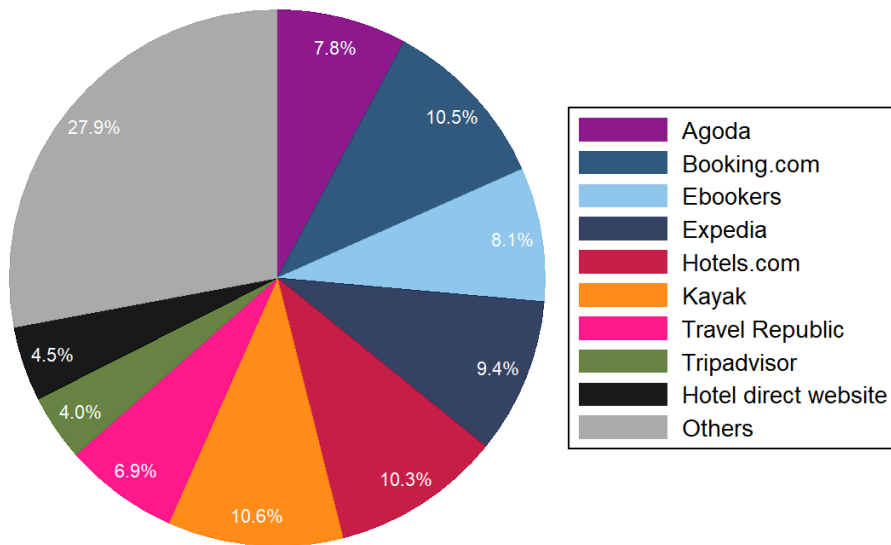
II.200. We start by analysing the share of each booking options (OTAs/TSPs) that appear when a number of queries are made on Kayak, including all the display positions¹⁷⁰ (Figure II.20).

¹⁶⁸ Expedia, Annual Report, 2013: “From a product perspective in 2013, 72% of our revenue comes from transactions involving the booking of hotel reservations, with 8% of our revenue derived from the sale of airline tickets. We believe that the hotel product is the most profitable of the products we distribute and represents our best overall growth opportunity.”

¹⁶⁹ Please note that we conducted the analysis with reference to the hotel segment to make Kayak and Trivago results comparable. Indeed, while Kayak is a full-service MSS, Trivago only allows to search and compare hotels.

¹⁷⁰ Annex D describes how data analyzed in this section was collected and elaborated.

Figure II.20: Share of booking options for Kayak results¹⁷¹



Source: Lear based on Kayak data

II.201. Expedia, together with its brands Hotels.com and Ebookers, is the booking option with the highest share (27.8%). Booking.com, together with its brand Agoda, is the second largest option (18,3%). However, the figure also points out the existence of a variety of offers and a large number of competitors listed on the Kayak website. The category Other indeed includes 24 additional booking options.

II.202. The facilitated booking option¹⁷² provided by Kayak itself is one of the options with the largest share. The booking option offered by the TSPs, included in the category “Hotel direct website”, represent only 4.5% of the available booking options.

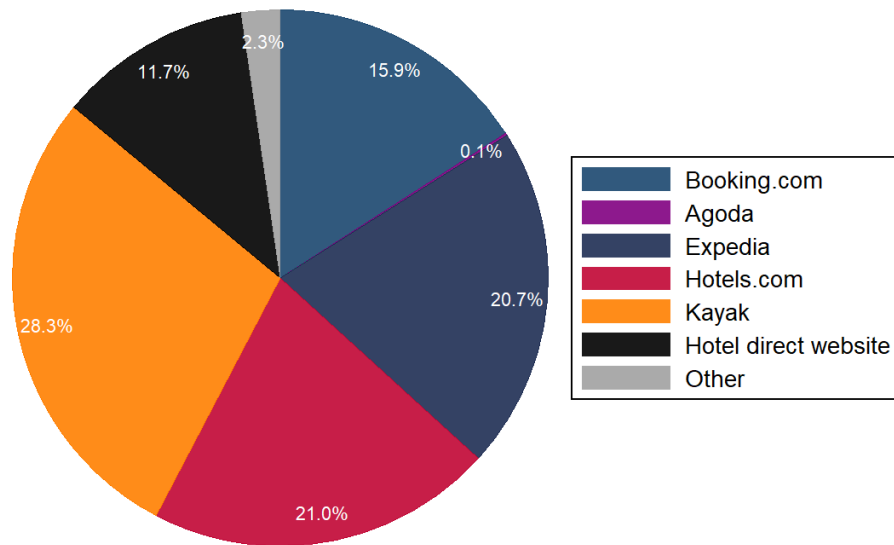
II.203. Figure II.21 shows the share of each booking option within the results displayed in the “View Deal” position. Considering all the hotels and destinations in the sample analysed, Kayak appears as “View Deal” in 28.3% of cases, followed by Hotels.com (21%), Expedia (20.7%) and Booking.com (15.9%). However, the share of booking options in the “View Deal” position may be higher for these OTAs, since they may also appear as part of the Kayak option through the facilitated booking agreement.¹⁷³ The TSP may also be shown on the “View Deal” position, with a highest share than when considering all the display position.

¹⁷¹ The category “Other” includes 24 booking options.

¹⁷² Kayak appears as one of the booking options in the results page thanks to the facilitated booking agreements held with different OTAs. In particular, Kayak.co.uk has facilitated booking agreements with six different OTAs: Hotels.com, Expedia.co.uk, Booking.com, Amoma.com, Agoda.com, getaroom.com. Therefore, when Kayak appears as a booking option, users can proceed with the reservation by remaining on Kayak’s website, while instead the service is provided by one of these OTAs, whose name and logo will appear on Kayak’s booking page.

¹⁷³ Please note that in this analysis, when Kayak is displayed among the booking options it is not possible to know through with OTAs the reservation would be processed.

Figure II.21: Share of booking options in “View Deal” position for Kayak results¹⁷⁴



Source: Lear based on Kayak data

II.204. The shares of the booking options in the “View Deal” position indicate that the operators which are more often listed in such privileged position are also those who have the greatest number of users in the UK market (see Figure II.18). The same findings may be drawn when looking at the share of booking options in both the “View Deal” position and the search results page, which can be both considered as favourable positions to attract consumers.¹⁷⁵ This is indeed related to the mechanism through which MSSs allocate such position to the OTAs.

II.205. As described on Kayak’s websites¹⁷⁶, when the same hotel is available on several booking sites, Kayak creates a ranking of the different deals for the hotel based on an internal algorithm that takes into account:

- prices;¹⁷⁷
- whether users prefer a particular booking site, as expressed by the click-through rate;
- Kayak’s revenue for the results shown, i.e. how much the OTAs/TSPs pay for clicks or bookings that they get via Kayak;
- whether the booking site pays extra for a promoted placement.

II.206. Since there are several parameters that enter the algorithm, and there is the presumption that each parameter is as much relevant as the others, paying an extra-price for the promoted placement does not ensure to be listed in the most favourable position. In other words, OTA cannot buy the “View Deal” position on the Kayak website.

¹⁷⁴ The category “Other” includes Amoma, Homeaway and Tripadvisor.

¹⁷⁵ Figure D.3 in Annex D. Expedia, Kayak, Booking.com and Hotels.com are more frequently listed in both the “View Deal” position and the search results page. The same applies when considering only the top three hotels in the search results page, which should have a prominent position compared to the others when consulted by consumers (Figure D.4).

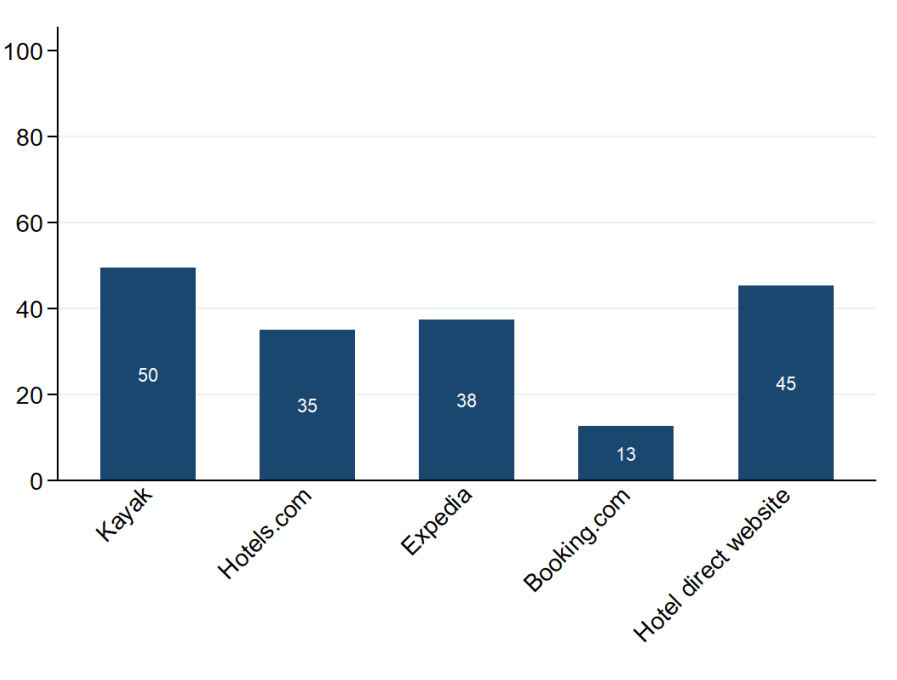
¹⁷⁶ <https://www.kayak.co.uk/help>.

¹⁷⁷ Indeed, the booking offers listed in the “View Deal” position are not always the cheapest offers for a given hotel: data collected indicates that the “View Deal” offers represent the cheapest alternative only in the 37% of cases.

II.207. The algorithm is such that OTAs that are expected to be more attractive for users (higher click-through rate, lower price), and pay higher commission to the MSSs, are more likely to be shown in the “View Deal” position or in the search results page. To the extent that consumers check with less frequency the options available under the “More sites” button, this may hinder the emergence of new and small players and limit the choice of consumers.

II.208. While Priceline (Booking.com) and its brands appear as much as Expedia and its brands in the “View Deal” position, Priceline is rarely the cheapest among the options available. Figure II.22 shows that Booking.com offers the cheapest price only 13% of the times it is listed in the “View Deal” position.¹⁷⁸ Expedia, instead, charges the lowest prices 38% of the times it appears in “View Deal”. Booking.com is the OTA that charges the lowest price with less frequency when listed in the “View Deal” position.

Figure II.22: Frequency at which OTAs/TSPs charge the lowest price when listed in “View Deal” for Kayak results (%)



Source: Lear based on Kayak data

II.209. Results may hence indicate the existence of bias towards the main Priceline brands, i.e. Booking.com, at the expense of other OTAs, especially those as attractive to users as Booking.com, and of consumers who may have been better off with the cheapest offer. This also contradicts the OFT’s position at the time of the merger that consumers would have noticed such a bias, and that the merged entity would have had no incentive to pursue such strategy. However, a number of caveats should be considered:

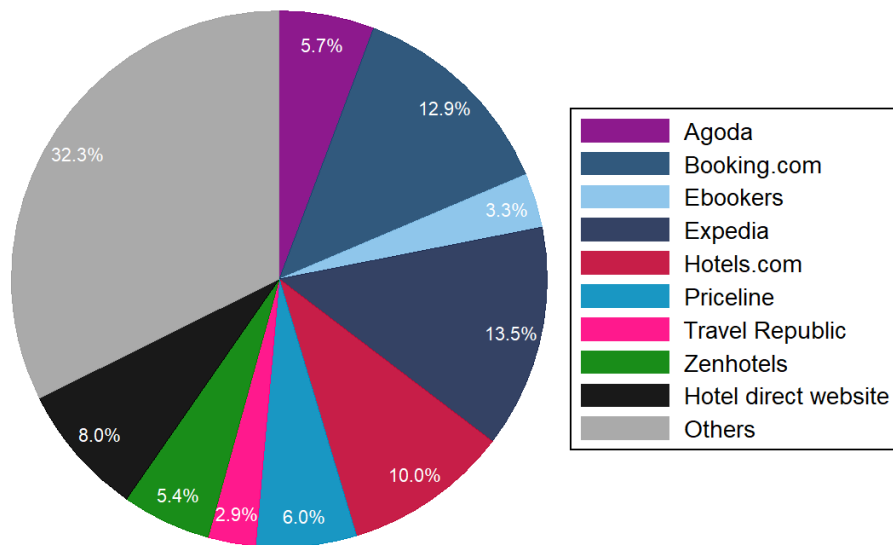
- first, Booking.com may offer the cheapest price for a given hotel behind the “View Deal” position filled by Kayak under facilitated booking arrangements. This may increase the frequency it offers the cheapest price when listed in “View Deal”;

¹⁷⁸ Similar results are obtained when looking at the offers listed both in the “View Deal” position and the search results page. See Annex D (Figure D.5).

- second, prices do not usually vary significantly across booking options. Across all the accommodations analysed, the value of the coefficient of variation is on average equal to 7.6%.

II.210. Below we repeat the same analysis for a sample of destinations on the Trivago website. Figure II.23 shows the share of booking options that appear on Trivago, including all the display positions. Differently from Kayak, Trivago does not have any facilitated booking agreement, hence it does not appear among the booking options available to customers.

Figure II.23: Share of booking options for Trivago results¹⁷⁹



Source: Lear based on Trivago data

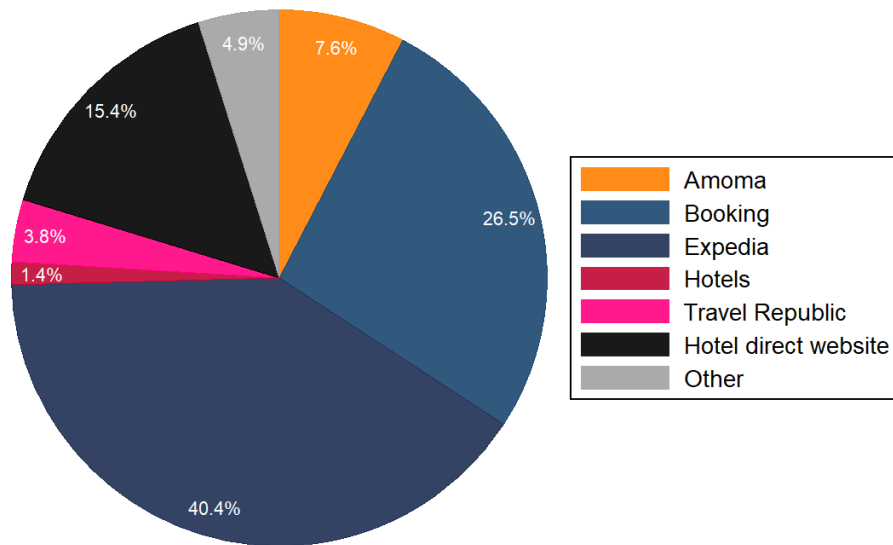
II.211. As noted for Kayak’s results, Trivago displays the booking options of a wide range of OTAs/TSPs. The category Other includes additional 34 booking options. The most frequent booking option available is Expedia, also with its brands Hotels.com and Ebookers (26.8%), followed by Priceline (Booking.com) and its brand Agoda (18.6%).

II.212. Figure II.24 shows the share of each booking option within the results displayed in the “View Deal” position. Expedia is by far the OTA more displayed in such position (40.4% of times), followed by Booking.com (26.5%) and the booking option of the TSPs (15.4%). The share of Expedia in the “View Deal” position on Trivago is much higher than the share registered in the same position on the Kayak website.¹⁸⁰

¹⁷⁹ The category “Other” includes 34 booking options.

¹⁸⁰ The same applies when considering only the top three hotels in the search results page. See Annex D, Figure D.6.

Figure II.24: Share of booking option in “View Deal” for Trivago results¹⁸¹



Source: Lear based on Trivago data

II.213. When looking at the “View Deal” position on the Trivago website, consumers are more often directed to Expedia, rather than other main brands, such as Booking. However, when considering both the “View Deal” position and the search results pages, which can both be deemed more favourable position than the “More sites” position, the share of Expedia is equal to 21.7%, followed by Booking.com (20.4%) and the TSP (14.4%).¹⁸²

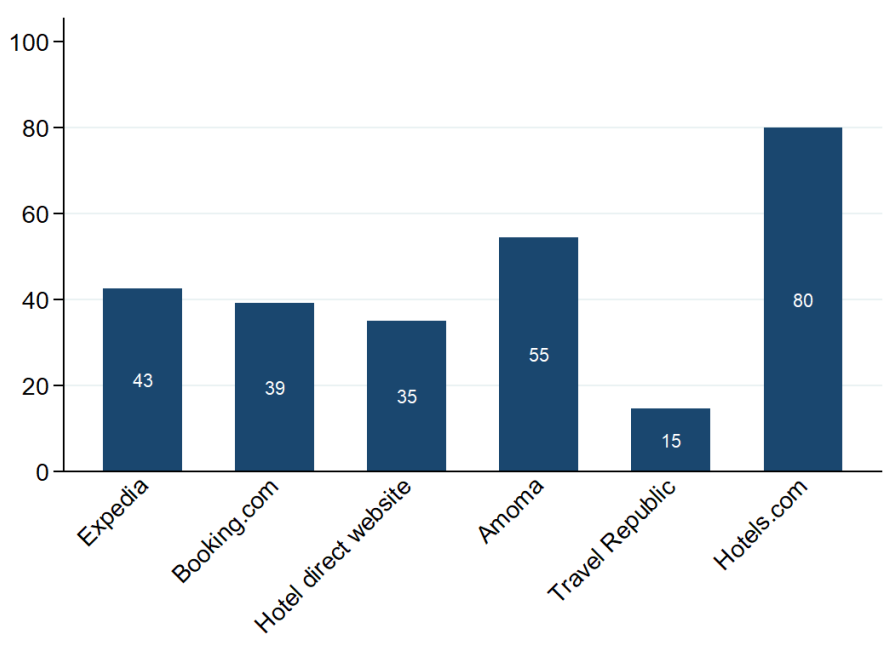
II.214. Furthermore, data on prices suggest that, when listed in the “View Deal” position, Expedia is the player that charges the lowest price much more often than its main rivals¹⁸³ (Figure II.25). It is thus unclear in this case whether Trivago is biasing consumers towards its own brand, as Expedia may have represented the best option for consumers in any case.

¹⁸¹ The category “Other” includes Alphasrooms, Ebookers, Japanican, Loveholidays, Otel, Prestigia, Tablethotels, Travelup.

¹⁸² See Annex D, Figure D.7.

¹⁸³ When displayed in “View Deal”, Expedia charges the lowest price 43% of times, Booking.com charges the lowest price 39% of times, the TSP charges the lowest price 35% of times.

Figure II.25: Frequency at which OTAs/TSPs charge the lowest price when listed in “View Deal” for Trivago results (%)



Source: Lear based on Kayak data

II.215. In any case, the existence of a bias in the search results is unlikely to amount to a foreclosure. The evidence collected shows that there is clearly the ability to bias results. Moreover, while there may be an incentive to favour the OTA in the group, this is to some extent counterbalanced by other factors. MSSs allow consumers to search and compare travel offers among different OTAs and TSPs. To the extent that results shown in most prominent positions in the search results page are more consulted by consumers, biasing such results in favour of a single OTA may lower the quality of the service provided, and ultimately entail foregoing traffic and revenues. Furthermore, the evidence collected on the evolution of MSSs in the UK market suggest that there exist several MSSs, other than Kayak and Trivago, that consumers may use. In particular, consumers can still search and compare travel services on TripAdvisor and Skyscanner, which are the largest MSSs in the UK market. This may further reduce the incentive of Kayak and Trivago to pursue such a strategy and also limits its foreclosing effect.

II.4.3. Conclusions on Priceline/Kayak and Expedia/Trivago

II.216. The Authorities decided to leave open the question of whether OTAs and MSSs are in a vertical or horizontal relationship with one another. However, this was fundamental in deciding which ToHs should have been explored and may have led to inaccuracy in the assessment of unilateral effects. Indeed, the market share analysis as carried out by the Authorities is likely to be affected by a significant measurement problem: OTAs supply a wider range of services and therefore charge higher commissions, making revenues difficult to compare across the two types of services and market shares calculated on this basis inaccurate. Yet, the conclusion to dismiss unilateral effects ToHs was substantially correct, as OTAs and MSSs are unlikely to be each other’s closest competitor.

II.217. Further, in assessing the likelihood of a foreclosure, the Authorities relied on the ability of users to recognize a bias in MSSs’ search results favouring OTAs in their group. Available evidence shows however that users are heavily influenced by display position in search results and may not promptly recognize a relatively subtle bias such as that of giving certain OTAs a privileged position.

II.218. The assessment of the market structure arising after the mergers suggests that consumers have still a variety of options to search, compare and book their travel services. Priceline and Expedia brands seem however to be the largest brands among the OTAs in the UK market.

II.219. Most of the evidence collected points towards the existence of a complementary relationship between OTAs and MSSs, whereby OTAs are the main customers of MSSs. Facilitated booking agreements between OTAs and MSSs may however enhance the overlap between the two platforms, allowing consumers to make the booking on the MSSs website without being referred to the OTAs websites. Data collected on the Kayak website on a sample of accommodation queries and destinations shows that the facilitated booking option is among the most shown options, even when considering results in privileged display position.

II.220. The analysis conducted on the Kayak website shows that the merger *Priceline/Kayak* may have provided Kayak with the incentive to favour Booking.com offers. Although appearing as frequently as Expedia in the most favourable position in the search results page, Booking.com represents the cheapest offer less frequently than Expedia when listed in such position. To the extent that consumers heavily rely on the booking options listed in the most favourable display position, this raises the doubt that Kayak is referring customers to Booking.com offers more often than consumers would have desired. Similar conclusions do not seem to apply to the analysis conducted on the Trivago website. Moreover, the anticompetitive effects of such potential intermediation bias may be limited when considering that consumers still have access to several MSSs, other than Kayak and Trivago, and that these include large players such as TripAdvisor and Skyscanner.

II.5. AMAZON/THE BOOK DEPOSITORY

II.221. On 24 October 2011 the Authorities cleared Amazon’s acquisition of The Book Depository International Limited (henceforth “The Book Depository”). Amazon was active in the online retailing of several items, including books, DVDs, CDs, toys and games. The Book Depository was an online retailer of books, although it also offered a small number of other products such as DVDs, CDs and video and PC games. In the UK, The Book Depository offered its products both through its website and in Amazon’s store using Amazon’s Marketplace services.¹⁸⁴ Despite overlaps in the online retailing of DVDs, CDs, video and PC games, the OFT’s decision focused on the retailing of books since the parties submitted that The Book Depository’s sales of the other products were small.¹⁸⁵ Both parties offered books in physical, e-book and audio book formats. For the purpose of the OFT’s decision, the relevant market was the online retailing of physical books within the UK, considering any competitive constraint exerted by physical “bricks and mortar” retailers where warranted by the evidence. Moreover, the OFT examined the effects of the merger for “long tail” titles and best sellers both separately and together.

II.222. Given the horizontal nature of the transaction, the Authorities investigated a number of unilateral effects ToHs. In particular, the OFT considered whether the transaction could result in price increases and in a degradation of quality of the service offered through a reduction in the range of book titles offered; and it investigated whether The Book Depository was likely to expand considerably in the foreseeable future.

II.5.1. Methodology assessment

II.5.1.1 Identification of ToHs pursued by the Authorities and key elements underpinning them

Price competition in the online retail market for books

II.223. One of the Authorities’ concern was that book prices would increase because of the merger. The OFT gathered evidence for its assessment through internal documents and pricing data, including the parties’ pricing algorithms showing which competitors were used as benchmarks for pricing decisions. The investigation revealed that in 2010 Amazon unilaterally decided to remove The Book Depository from its pricing algorithm for long tail titles, but not for best sellers. For this reason, together with the Authorities’ belief that the competitive conditions varied between the two segments of titles and the existence of evidence pointing to the merging parties’ different focuses,¹⁸⁶ the possible effects of the merger in terms of price competition were assessed separately for long tail and best-selling books.

II.224. As far as long-tail titles are concerned, this ToH was dismissed based on the following key pieces of evidence:

- Amazon’s removal of The Book Depository from the pricing algorithm proved to be a profitable strategy: after removing The Book Depository, Amazon’s prices increased for a significant proportion of book titles offered by Amazon; yet, the retail contribution profit¹⁸⁷ for long tail titles rose substantially following this move. This evidence was taken as an indication that The Book Depository did not exert a substantial competitive constraint on Amazon;

¹⁸⁴ Amazon Marketplace is Amazon’s platform on which third party sellers are offered the opportunity to sell their products.

¹⁸⁵ The largest figure was £ 660,000 for recorded music CDs.

¹⁸⁶ In the financial year previous to the OFT’s investigation, almost 75% of The Book Depository’s revenues came from long tail titles, whereas two-thirds of Amazon’s book revenues were generated by the sale of best sellers.

¹⁸⁷ Contribution profit is a measure of profitability based on direct and variable costs, excluding fixed costs.

- the majority of customers who switched away from Amazon as a consequence of price increases switched to book retailers other than The Book Depository. This conclusion was based on diversion of sales from Amazon to The Book Depository: only around 12-13% of Amazon's lost sales were diverted to The Book Depository. In particular, the evidence before the OFT showed that it was Amazon Marketplace sellers who provided the strongest competition towards Amazon.

II.225. As regards the online retailing of best-sellers, price competition concerns were rejected mainly based on the following:

- The Book Depository's business model was skewed towards the long-tail segment, thus bringing a minimal increment to Amazon's UK turnover;
- evidence of strong competition on Amazon Marketplace. For best sellers, the Book Depository was the cheapest seller on Amazon Marketplace 11% of the time; for those 11% of titles, the next cheapest retailer on Amazon Marketplace was Amazon itself in less than 1% of instances. In almost three-quarters of cases, the next cheapest was another seller on Amazon Marketplace. This analysis was considered an indication of strong competition on Amazon Marketplace and of the fact that the merging parties were not particularly close competitors for titles sold on Amazon Marketplace;
- a natural experiment conducted by The Book Depository consisting of increasing its prices by 10% for one day, which revealed that the decrease in sales was stronger on Amazon Marketplace than it was on The Book Depository's own website;
- the Authorities conducted an illustrative price rise¹⁸⁸ (IPR) analysis and found only a weak incentive to raise prices post-merger. Specifically, the result of the OFT's calculations was an IPR of around 2%.

Introduction of charges for the delivery of books

II.226. Pre-merger, both parties were offering free delivery in the UK; one third party questioned whether Amazon's more recent decision to abolish a minimum spend to qualify for free delivery on an order was influenced by The Book Depository's policy implying that the merged entity's strategy could change following the Transaction, in particular removing this benefit, as some customers feared. The OFT considered that Amazon's internal documents revealed that:

- Amazon benchmarked its delivery policy against some key competitors which did not include The Book Depository;
- Amazon's delivery policy was applied consistently across all of its media products and it wanted its delivery charges to be uniform across all of its product lines.

II.227. This evidence was taken as an indication that The Book Depository did not play any role in Amazon's decision to abolish a minimum spend to qualify for free delivery and was therefore key for the dismissal of this ToH.

Decrease in the range of books offered

II.228. At the time of the merger, Amazon offered approximately 9.5 million book titles compared to The Book Depository's 6 million titles. To address some concerns received by third parties, the OFT investigated whether the merger could lead the parties to reduce the range of book titles available especially in the deep range. This ToH was discarded noting that:

- online retailers are particularly well placed to offer a large number of titles given that they do not need to hold stocks but can instead access a wide range of titles via book wholesalers. This was

¹⁸⁸ The IPR model is one of several models which measure the upward price movements of a merged entity; in particular, it aims at predicting the extent to which the merged entity has both the ability and incentive to implement a price rise.

supported by evidence, provided by the merging parties, that other online retailers offered a large range of titles;¹⁸⁹

- the analysis conducted by the Authorities in the assessment of the price competition concerns in the long tail segment suggested that the parties were not close competitors for these book titles, which led the OFT to conclude that it was not the competitive constraint coming from The Book Depository that made Amazon offer a wide range of books. This conclusion was also consistent with the parties' submission that Amazon already offered a wide selection of books before The Book Depository entered the market.

Potential competition in the online retail market for books

II.229. The OFT was concerned that The Book Depository could expand considerably in the foreseeable future and that therefore the merger would eliminate a potentially strong competitor to Amazon. However, this ToH was dismissed based on the following key evidence:

- The Book Depository's UK turnover in the past years had not witnessed constant year-on-year growth; rather, it had been fluctuating. In particular, the parties submitted that The Book Depository's UK turnover in 2008-09 was £23 million, in 2009-10 it was £18 million and in 2010-11 it was £30 million;
- The Book Depository's recent growth was mainly due to overseas sales.¹⁹⁰ As far as UK sales were concerned, their growth in the previous year came from Amazon Marketplace, where sufficient competition was expected to remain also after the merger, rather than from The Book Depository's own website.

II.5.1.2 Analysis of the key elements underpinning ToHs

Price competition in the online retail market for books

II.230. The dismissal of the price competition ToH rested on:

- the observation that including The Book Depository in the pricing algorithm for long tail titles was not a profit-maximizing strategy for Amazon;
- the behaviour of switching consumers in cases of a price increase by one of the parties;
- evidence of strong competition on Amazon Marketplace.

II.231. The OFT analysis with respect to price competition ToHs would seem to be convincing. The evidence collected suggested that the competitive constraint that the parties exerted on each other was not significant and that, therefore, the removal of such a constraint was not likely to result in an SLC in the form of price increase. In particular, the fact that Amazon's profit margins increased following the removal of The Book Depository from its pricing algorithm represents convincing evidence in this respect: had The Book Depository represented a significant constraint, the move would not have been profitable, as a larger share of Amazon customers would have switched to The Book Depository.

Introduction of charges for the delivery of books

II.232. This ToH was dismissed based on the following key arguments:

- Amazon benchmarked its delivery policy against some key competitors which did not include The Book Depository;

¹⁸⁹ In particular, according to the parties' submissions, Aphrohead offered 7 million titles, Blackwells 6 million titles, Waterstone's 5.8 million titles, and Foyles 3.5 million titles.

¹⁹⁰ Data provided by The Book Depository showed that over 70% of its growth over the previous year came from non-UK sales.

- Amazon’s delivery policy was applied consistently across all of its media products as it wanted its delivery charges to be uniform across all of its product lines.

II.233. The second argument might have benefitted from additional evidence on Amazon’s revenue share coming from book sales. Indeed, if this share was substantial, it could have been the case that the retailing of books drove Amazon’s decisions about all its product lines. However, on balance, it seems reasonable to conclude that the available evidence did not point to a significant risk that the transaction would have led to the removal of free deliveries.

Decrease in the range of books offered

II.234. The dismissal of this ToH rested on:

- the observation that online retailers, differently to physical stores, are well placed to offer a large range of titles and that, indeed, this was the strategy adopted by a number of online retailers;
- the conclusion that Amazon and The Book Depository were not particularly close competitors in the long tail segment.

II.235. The conclusion that the merger would not result in a significantly reduced range of book titles seems well grounded. To the extent that The Book Depository did not constrain Amazon on prices, it is reasonable to expect that it would not constrain Amazon on variety either.

Potential competition in the online retail market for books

The key arguments for the dismissal of this ToH were:

- evidence that The Book Depository had not witnessed constant growth in the previous years;
- the observation that a significant degree of competition was likely to persist in the Amazon Marketplace.

II.236. Differently from the other cases analysed (see for instance *Facebook/Instagram* and *Google/Waze* in sections II.2 and II.3 respectively), The Book Depository was not on a consistent growth path prior to the merger. This was correctly taken as an indication that it was not likely for The Book Depository to grow strongly in absence of the merger.

II.5.1.3 Analysis of completeness of ToHs pursued

II.237. The transaction entailed a vertical dimension that the OFT’s decision did not elaborate on. Indeed, Amazon competed with The Book Depository in the online retailing of books, but also supplied an important input to The Book Depository through its Marketplace, i.e. access to a large pool of potential buyers. The importance of being in Amazon Marketplace for a seller was stressed by the Authorities. This vertical relationship between the parties might have given scope for strategies aimed at foreclosing the merging parties’ rivals, for instance giving The Book Depository a preferential treatment post-merger, discriminating against other sellers in the Marketplace.

II.238. In order to understand whether the merged entity had the technical ability and economic incentive to implement this type of strategies, the Authorities should have investigated the functioning of the Marketplace more thoroughly. This would have been essential to understanding whether and through which mechanism there could have been scope for implementing foreclosing strategies. Amazon, indeed, is active across several product lines, for each of which there may be specific mechanisms for selecting the seller that is shown as the default option to consumers. Being the featured seller is extremely important since arguably the vast majority of customers ignore the other offers. The Authorities could have explored what mechanism was in place for books, whether it left room for favouring The Book Depository and whether there was an incentive for the merged entity to modify such mechanism after the merger. Our interview with Amazon revealed that at the time of the

merger Amazon was always the default option for the sale of new books on Amazon.co.uk, and that this has not changed since then.

II.5.2. Market outcome assessment

II.239. The market outcome assessment of *Amazon/The Book Depository* looks at:

- the economic rationale of the merger and the efficiencies achieved through it (section II.5.2.1);
- the evolution of prices charged by Amazon for physical books sold in the UK after the merger (section II.5.2.2).

II.5.2.1 Rationale and efficiencies of the merger

II.240. At the time of the merger, The Book Depository was active in several countries¹⁹¹, including countries where Amazon was not making significant sales or was not present. Moreover, The Book Depository was offering free shipping worldwide, making itself attractive to customers outside the UK and particularly well placed compared to Amazon in many countries

II.241. Today, The Book Depository is a fully-owned subsidiary of Amazon. The Book Depository has kept its own website and distribution centre; yet, other aspects, such as the billing system and the technology employed, have been integrated.

II.242. The Book Depository seems to have benefitted from Amazon expertise and technological background. Indeed, Amazon helped The Book Depository modernize its infrastructure and back-end technology and acquire the appropriate tools to deal with seasonal sale peaks.

II.5.2.2 The evolution of Amazon prices

II.243. At the time of its decision, the OFT ruled out that the merger could have led to a significant lessening of price competition since (i) The Book Depository did not exert a substantial competitive pressure on Amazon in the supply of books pertaining to both the long-tail and the best-seller categories; (ii) third-party sellers on Amazon Marketplace provided the strongest constraint on Amazon. By evaluating the evolution of prices before and after the merger, the following analysis assesses whether competition in the online market for physical books remained vibrant after the merger, and whether Amazon has been able to raise the prices.

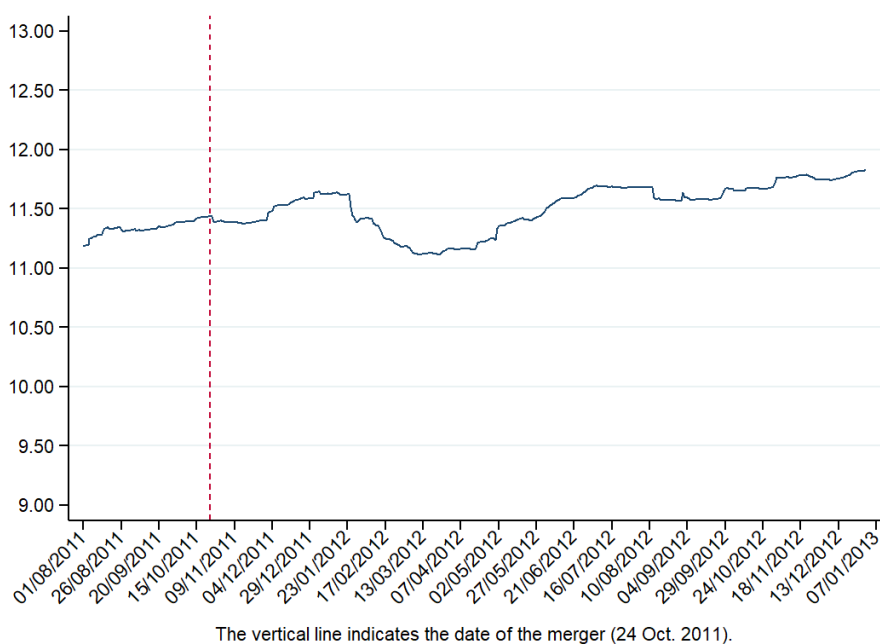
II.244. Figure II.26 shows the average daily price charged by Amazon for a sample of 7,014 books titles. For each title, we collected the price charged on Amazon.co.uk for each day between 1 August 2011 and 31 December 2012. All the selected titles have been continuously sold by Amazon over the period analysed.¹⁹³

¹⁹¹ Around 100 countries, according to Amazon.

¹⁹² This is based on an interview with Amazon.

¹⁹³ The price analysis is based on data extracted from Keepa, a website that tracks the price evolution of different items sold on Amazon. For each title, associated to a unique ASIN (Amazon Standard Identification Number), Keepa provides the historical price data from the time the title has been put on sale on Amazon. Based on the books' sales ranking in January 2019 on Amazon.co.uk, historical price data has been extracted for a subset of the first 500,000 books. In particular, for each batch of 50,000 titles ranking between 1 and 500,000, the first 5,000 books have been selected. The sample has been further

Figure II.26: Evolution of Amazon price (GBP)¹⁹⁴



Source: Lear based on Keepa data

II.245. Amazon prices in the UK online market for physical books appear relatively stable in the years after the merger: the average price ranges from a minimum of £ 11.10 (in March 2012), to a maximum of £ 11.80 in December 2012.¹⁹⁵ This may indicate that competition has remained lively after the merger, and Amazon may not have been able to raise prices.

II.246. This analysis, however, provides average price values across different books' categories, ranging from best seller to long-tail. Supply and demand conditions may be different across books' categories, and this may in turn affect their price levels and trends. For instance, the analysis conducted by the OFT at the time of the merger revealed that high street retailers mainly sell new books, best sellers and mainstream titles rather than long-tail titles, since they are restricted by limited retail space on the range they can stock. Competitive dynamics may be heterogenous across books categories, and average price trends may not be informative. However, data available does not allow to identify book categories precisely, as it is based on books' sales ranking on Amazon in January 2019.¹⁹⁶

II.247. Our approach to better measure the evolution of Amazon prices is twofold:

refined to include those titles that were published at least three months before the merger decision (i.e. at least in August 2011) and have been continuously sold over one-year time after that date.

¹⁹⁴ Please note that, since 2009, Amazon offers free delivery within the UK without imposing a minimum spend, hence books' prices correspond to the total consumer expenditure for books.

¹⁹⁵ Monthly prices range from £ 11.34 in September (the month before the merger), to £ 11.41 in October (the month in which the merger took place), and finally to £ 11.39 in November and £ 11.55 in December (the months following the merger).

¹⁹⁶ Based on the sales ranking in 2019: 4.1% of the 7,014 titles in our sample are in the ranking 1-5,000; 7.1% in the ranking 50,000-55,000; 9.8% in the ranking 100,000-105,000; 11.2% in the ranking 150,000-155,000; 11.8% in the ranking 200,000-205,000; 11.8% in the ranking 250,000-255,000; 11.3% in the ranking 300,000-305,000; 11.8% in the ranking 350,000-355,000; 10.9% in the ranking 400,000-405,000; 10.2% in the ranking 450,000-455,000. This ranking, however, does not necessarily apply to the period 2011-2012.

- we first evaluate the trend of average Amazon prices around the merger date, investigating the weekly price variation with respect to the week of the merger. By restricting the analysis to the period shortly after the merger date, the analysis may limit the effect of any confounding factor, other than the merger, which may affect the price trend, such as a change in the book status;
- we evaluate the trend of Amazon prices around the merger date for a single books' category, namely a small set of best-seller books. Although based on very small sample, the analysis does not aggregate prices across different books' categories and may corroborate findings from the first analysis.

II.248. Table II.2 shows the percentage changes¹⁹⁷ of Amazon prices for the large (and heterogenous) sample of books titles, in the weeks following the merger, with respect to the price in place in the week right before merger. We alternatively computed the average price Amazon charged before the merger as the price charged in the week in which the decision has been published (third column), or in the week after the decision has been issued (fourth column).

Table II.2: Percentage variation of Amazon prices for a large sample of books titles

Week after the merger	Amazon price	Variation from price in place in the week of the merger decision	Variation from price in place one week after the merger decision
0	£ 11.42	-	
1	£ 11.39	-0.20%	-
2	£ 11.39	-0.27%	-0.07%
3	£ 11.38	-0.33%	-0.13%
4	£ 11.39	-0.23%	-0.03%
5	£ 11.42	0.04%	0.24%
6	£ 11.51	0.84%	1.04%
7	£ 11.53	1.04%	1.24%
8	£ 11.57	1.38%	1.58%
9	£ 11.59	1.52%	1.72%

Source: Lear based on Keepa data

II.249. The analysis shows that prices charged by Amazon for physical books in the UK have not substantially increased right after the merger. Prices have indeed decreased for four weeks after the merger, and then slightly increased. Nine weeks after the merger decision – which corresponds to the last week of December 2011 – the average price was 1.52% higher.

II.250. Table II.3 replicates the same analysis for a limited set of best-seller titles, the same set of titles used for the analysis that the merging parties submitted to the OFT. Indeed, during the investigation, the parties provided the OFT with pricing data for 40 best seller titles between January and June 2011.¹⁹⁸

¹⁹⁷ The average weekly price has been computed after calculating the average daily price of the books' subset.

¹⁹⁸ The parties provided pricing data for books ranked 1-10, 100-110, 500-510, 5000-5010 based on sales ranking on Amazon.co.uk. Data on price evolution around the merger period for the same sample of books used in the OFT's analysis has been extracted from Keepa. In particular, for 36 out of 43 titles it has been possible to track price evolution over the period between 1 August 2011 and 31 January 2012. For the remaining 7 titles, data was not available.

II.251. Compared to the average prices presented above, best seller prices are lower, ranging from £ 6.34 on 1 August 2011 to £ 6.91 on 31 January 2012.¹⁹⁹ Average weekly price for best-seller titles slightly decreased in the three weeks immediately following the merger, while later increased, reaching the level of £ 6.62 nine weeks after the merger. Amazon prices for the selected best-seller titles show a percentage increase of 3.13% with respect to the price in place in the week of the merger decision, and 3.86% with respect to price in place in the week after the merger decision.

Table II.3: Percentage variation of Amazon prices over time for best-seller titles

Week after the merger	Amazon price	Variation from price in place in the week of the merger decision	Variation from price in place one week after the merger decision
0	£ 6.42	-	
1	£ 6.37	-0.70%	-
2	£ 6.32	-1.60%	-0.90%
3	£ 6.41	-0.07%	0.63%
4	£ 6.42	0.04%	0.75%
5	£ 6.46	0.59%	1.30%
6	£ 6.54	1.82%	2.54%
7	£ 6.54	1.90%	2.62%
8	£ 6.56	2.19%	2.92%
9	£ 6.62	3.13%	3.86%

Source: Lear based on Keepa data

II.252. The evidence collected on best-sellers confirms the results obtained for the larger sample of books: Amazon has not significantly increased prices after the merger. The percentage price increase is at most equal to 3.86%. This is slightly higher than the results of the illustrative price rise (IPR) exercise computed by the OFT at the time of the merger investigation.

II.253. In a “difference in differences”²⁰⁰ logic, the best-sellers sample (Table II.3) can be considered as a control group and the price variation observed within this group as the change in prices physical books would have experienced in the absence of the merger. At the time of the merger, The Book Depository exerted a stronger competitive constraint on books pertaining to the long-tail category, rather than best sellers. Moreover, Amazon faced more competitors, both online and offline, for best-sellers. Therefore, prices of best-seller books were less likely to be affected by the merger and the removal of the competitive constraint exerted by The Book Depository on Amazon.

II.254. The large sample of books (Figure II.26 and Table II.2) is instead composed by titles that have been published before the date of the merger, and are still on sale on Amazon website in 2019. It is hence likely that these include deep-range titles. This group can be considered as the treated group, where the competitive constraint exerted by The Book Depository at the time of the merger is

¹⁹⁹ The average daily price has been computed as described for the subset of 7,014 titles.

²⁰⁰ The Difference in Differences approach is an established and widely used methodology in ex-post evaluation studies. It entails looking at one or more market outcomes (e.g. prices) for a group of units affected by a policy intervention and compare them to the outcomes of a control group that was instead not affected. The variation over time in the outcome variables of this control group is then used to establish what would have occurred in the absence of the intervention in the treated group. This approach however relies on the treated and control group to have similar trend, in terms of the market outcomes considered, before the policy intervention.

expected to be higher. In other words, the price charged for these books is more likely to have been affected by the merger.

II.255. Data shows that the best-seller books (control group) experienced a higher price increase than the books included in the large sample (treated group). For the group of titles where the competitive constraint exerted by The Book Depository was weaker, and the merger effects less likely, the observed price variation has been lower. This may be interpreted as additional evidence that consumers have not been harmed after the merger through a substantial price increase for physical books.

II.256. This finding seems to be consistent with the fact that the online market for the retail of physical goods in the UK has benefitted from the entrance of several players, such as Hive, which is an online network of 360 independent bookstores in the UK, and Wordery.²⁰¹ Wordery has been generally considered as the main competitive threat of The Book Depository and entered the market in 2012.²⁰² Waterstone, WHSmith and Tesco are still operating online, and competing with Amazon.

II.5.3. Conclusions on Amazon/The Book Depository

II.257. The decision to clear Amazon's acquisition of The Book Depository appears convincing. The evidence collected suggested that The Book Depository was not exerting a strong constraint on Amazon, and that other sellers on Amazon Marketplace were likely to exert a stronger competitive pressure. The empirical analyses indicated that the merger was not likely to result in an SLC via a price increase or a decrease of the range of offer. However, the Authorities might have investigated the vertical relationship between the parties and assessed whether Amazon could have had the incentive to discriminate against rivals by providing The Book Depository with a preferential treatment on its Marketplace.

II.258. The assessment of the market performance after the merger revealed that Amazon did not substantially raise books' prices after the merger. Indeed, prices have been decreasing right after the merger, and slightly increased (by 1.5% to 3.8%) in a one-year time span. The highest price increase has been observed for the sample of best-seller titles, where the competitive constraint exerted by The Book Depository was weaker, and is hence less likely to be related to the merger.

II.259. Although the estimate of the merger effects would require the identification of a counterfactual, the price evidence collected seems to suggest that the market development after the decision to clear the merger has not harmed consumers. Prices, however, do not represent the unique parameter of competition. The evaluation of the market performance after the merger may have also looked at non-price dimensions such as the range of books offered. Unfortunately, data available did not allow such analysis.

²⁰¹ This is based on a phone interview with Amazon.

²⁰² <https://www.finder.com.au/wordery-vs-book-depository>

II.6. CONCLUSIONS ON CASE BY CASE REVIEW

II.260. Digital markets pose several challenges to some paradigms of analysis traditionally employed in competition enforcement. Despite the depth of the analyses carried out by the Authorities, our evaluation of past merger decisions taken by the UK Authorities has revealed certain gaps in the way these cases were analysed, which in some cases may have resulted in the realization of market conditions less conducive to a competitive outcome. Such gaps do not by any means undermine the legitimacy of the Authorities' decisions and are only perceivable today thanks to a better understanding of how digital markets work and to the possibility to observe the actual evolution of some market players that was highly uncertain at the time the mergers were investigated.

II.261. First, the Authorities have not always consistently framed the competition issues they were looking at in a two-sided setting. The economic literature reviewed in section A.1.1 shows that in two-sided markets characterized by indirect network effects, with one side of the market creating relatively more value for the other, an asymmetric price structure is a typical market outcome: services are often offered for free or even at negative prices to the group of users that create relatively more value for the other, and losses are recouped by the platform on the other side. The two (or more) sides of the market should be looked at jointly, as choices made by the platform on the various sides are interdependent.

II.262. Yet, in some cases, the Authorities have focussed their attention on the users' side of the market, somewhat overshadowing other sides of the market. In *Facebook/Instagram*, the Authorities may have placed excessive weight on the functionality offered by the parties' products on the users' side of the market. The Authorities stressed that, at the time of the merger, Instagram had limited social network functionalities, and this helped the Authorities conclude that Instagram was not a significant potential competitor in the supply of social networking services. Of course, what an app allows its users to do matters when carrying out a competitive assessment. However, in two-sided markets where services are provided to users for free and monetized elsewhere, functionalities perhaps are not important *per se*; rather, what matters the most is the role they perform in platform's monetization strategy. Facebook and Instagram could have been substitutable between each other from the perspective of advertisers, regardless of certain differences in the precise functionalities that they supplied to users.

II.263. In *Google/Waze*, the Authorities have focussed their ToHs on the users' side of the market, omitting to explore the way the services provided by the merging parties were monetized. Indeed, users' engagement with turn-by-turn navigation apps may produce valuable information to be monetized elsewhere: users of mapping services generate location data which provides value for the supplier of these services as users' movements behaviour reveals additional information on their preferences, allowing better targeted advertising; moreover, location data is used for a variety of other purposes. The sole focus on users may have resulted in the development of an incomplete set of ToHs, overlooking possible ways that the merger could have led to competitive harm.

II.264. More generally, current business models and monetization avenues should represent an unavoidable step for the development of a ToH because, quite simply, market power is not exerted for its own sake, but has the ultimate objective of increasing profits. Investigating the monetization strategy is important because it can uncover additional, potentially anti-competitive effects of the merger. Moreover, it can shed light on the rationale of the merger from the parties' perspective, as it will make clear how the target brings value (that is, profits) to the acquirer. However, the Authorities should also investigate the users side of the market as competition problems can lead to non-price effects on users.

II.265. Further, the set of decisions analysed has revealed gaps in the Authorities' understanding of digital markets. In *Facebook/Instagram*, the Authorities might have neglected to analyse the factors

that drive advertisers' choices, how the merging parties fared with respect to each of them, and how their combination could have resulted in competitive harm. The exclusivity of the user base, the size of the user base and the accuracy that can be delivered in targeting are all relevant dimensions of competition that the merger was likely to affect. However, as discussed in section I.5, more research is needed to better understand how competition works in the sector.

II.266. Similar gaps can be found in the way that *Priceline/Kayak* and *Amazon/The Book Depository* were assessed. In *Priceline/Kayak*, the Authorities did not determine whether the services supplied by MSSs and OTAs should be regarded as substitutes or complements, which may have led to measurement problems in the assessment of unilateral effects through market share evidence. In *Amazon/The Book Depository*, the Authorities did not consider the existence of a possible vertical relationship between the merging parties, which may have called for the investigation of foreclosure ToHs.

II.267. In the assessment of potential competition, and most notably in *Facebook/Instagram* and *Google/Waze*, the Authorities identified the correct evidence and found that Instagram and Waze had witnessed constant and significant growth in the years leading up to the merger, had promising business models and plans for an expansion that might have increased their relevance in the markets where their acquirers were active. Yet, the Authorities dismissed this evidence mostly due to the uncertainty surrounding whether Instagram's and Waze's potential would have been realized. Rarely, if ever, will the Authorities find conclusive evidence of future growth: potential competition ToHs will always entail a certain degree of uncertainty. If the Authorities wish to pursue this type of ToH in the future, then they should be willing to accept a greater degree of uncertainty in their evaluations.

II.268. While we have identified some gaps in the way that the Authorities analysed these cases, it is not always clear whether competitive harm has arisen as a result of such gaps. The decisions taken in *Facebook/Instagram* and *Google/Waze* may have represented missed opportunities for the emergence of challengers to the market incumbents but have also likely resulted in efficiencies. The decisions taken in *Priceline/Kayak* and *Amazon/The Book Depository* appear less controversial, as the level of competition in the markets concerned does not seem to have been substantially affected by the mergers.

A. Survey of economic literature

Digital industries create new challenges for competition policy. This survey dwells on some key characterizing features of digital markets that shape the policy debate: network effects, multi-sidedness, big data and rapid innovation. These characteristics make it efficient and/or more likely to have market concentration. Also, they reduce the beneficial effect of unfettered competition.

While there is no one-size-fits-all framework, with different markets characterized by different combinations of the above features, in what follows we tackle them in isolation:

- section A.1 discusses the role played by direct and indirect network effects in shaping competition dynamics;
- section A.2 explores the recent literature on the so-called *markets for attention*, which proposes to consider platforms reselling attention as being in the same relevant market regardless of the particular function they perform;
- section A.3 provides an overview of the link between mergers and innovation in technology markets, discussing *inter alia* the notions of entry for buyout and killer acquisition;
- section A.4 discusses big data and its potential role as a barrier to entry.

A.1. Direct and indirect network effects

In its simplest incarnation, the term “network effects” refers to the fact that in some markets, a firm’s total demand or market share has a *direct* effect on consumption value. For instance, the value of joining a social media platform or a communication service is clearly increasing in the number of other users a consumer can potentially interact with. In other markets, the link is subtler. “Network-like effects” sometimes arise due to demand-driven dynamic economies of scale, i.e. learning by doing. For example, users of search engines typically do not care directly about the engine’s market share. However, the quality of search results is intimately connected to the scale of operations.²⁰³

In many other markets these feedbacks may link one group of economic agents to another group and in this case network effects are said to be *indirect*. A classic example is that of operating systems (“OSs”) such as Google’s Android or Apple’s IOS. Users value choice. Thus, systems that boast more apps are clearly more attractive. Vice-versa app developers value access to larger users’ pools. Nobody wants to incur in the fixed cost of developing an app for a system that only a few adopt. Another notable example are content providers such as Yahoo.com. Much like their off-line counterparts (e.g. Free-to-Air broadcasting stations), these harvest the attention of their customers by providing valuable content and then resell that attention to advertisers. Notice that in this illustration externalities from advertisers to consumers are negative as consumers typically prefer ad-free content. As said, these firms are typically referred to as multi-sided platforms. Again, the main idea is to think of multi-sided platforms as economic intermediaries that either enable or facilitate the interaction between market participants. The value that users on one side of the market assign to the platform depends on how many users on *other* sides of the market also patronize the platform. Of course, there is a very large literature on multi-sided markets pioneered by Caillaud and Jullien (2003); Rochet and Tirole (2003, 2006) and Armstrong (2006)²⁰⁴ and surveying that literature is vastly beyond the scope of this document. The goal of this section is to explain the basic economics of *indirect* network effects and, in particular, how these change the nature of market power, the scope for market tipping, and the effect of competition relative to the “one-sided” markets.

²⁰³ Search engines typically “learn” about relevance of URLs to particular queries by observing and analysing users’ behaviour on search result pages. URLs that are clicked more often are obviously more likely to be relevant. More users therefore imply more accurate results.

²⁰⁴ More policy-oriented early contributions are Evans and Schmalensee (2005) and Evans (2003).

A.1.1. Overview of market power with network effects

In digital markets the economic surplus derived from trade often directly depends on the other agents' consumption choices. Indeed, network effects are a key distinctive feature of these markets whose firms are typically referred to as "platforms."²⁰⁵

As the overarching goal of competition policy is that of alleviating the social harm caused by market power, this section highlights the nature of that harm in a simple context with a monopoly platform. The monopoly paradigm fits particularly well in this context as a "rich get richer" industry dynamics, whereby more users enhance the dominant firm's attractiveness leading to even more users, typically leads to high level of concentration (or market tipping). Furthermore, concentration is efficient, but its benefits have to be weighed against its costs due to market power.

The exposition is divided in four parts. The first part introduces the concept of network effects, distinguishing between direct, indirect and "network like" effects due to demand-driven economies of scale. The second part looks at market power in the context of traditional network businesses. In the third part, we first note that, by lowering a range of costs, the internet has facilitated the creation of new businesses marked by the interaction of various types of economic agents which can be charged different prices. In these markets, referred to as "multi-sided," network effects go across sides: agents of one type care, among other things, about the choices of agents of other types other types. Multi-sided markets are more complex in many ways, so they deserve special treatment.

The last section recognizes that platforms shape economic outcomes by controlling dimensions other than price and reviews the literature on market power and product design choices: algorithms, rankings and search diversion.

Market power with direct network effects

Market power refers to the ability of a firm to profitably raise prices above marginal cost. Its *extent* depends on how far prices are from these marginal costs. When choosing how much to raise prices, i.e. when choosing mark-ups, firms typically trade off quantity (less units sold) for prices (higher price charged for all other units sold). Of course, whether this trade-off leads to a large or small mark-up depends crucially on the elasticity of consumer demand to price. More elastic demands induce lower mark-ups and vice-versa. That is, market power is inversely related to the elasticity of demand.

A first point is what is the impact of network effects on demand elasticity. To build intuition, consider the following exercise. Starting from any price consider the effect of a 1% price increase. A first direct and familiar consequence is that demand, given consumer expectations about what other consumers will do, goes down as consumers at the margin between buying or not now prefer to drop out. But of course, being this a network good, the lower quantity sold reduces all consumers' willingness to pay, further reducing demand and so on. This second effect is entirely new and goes through consumer expectation over network size. The stronger these network effects, the larger the elasticity. In extreme cases (for instance, goods which work only if some critical mass is reached), small price changes can wipe out demand entirely.

Thus, other things equal, network effects induce *smaller* mark-ups. The larger these effects, the smaller the mark-ups. Box A.1 formalizes this point.

Box A.1: Consumer expectations and network size

To formally illustrate the additional role played by consumer expectations over network size, it is convenient to parametrize (somewhat unconventionally) the demand in a way that highlights its dependence on expectations. Let $P(q, q^e)$ denote the inverse demand. Specifically, this is the price at

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There is no universally accepted convention of what the term "platform" means, as it has been widely used in at least four disciplines: economics, management, marketing and law.

which a monopolist can serve q consumers when all market participants operate under the conjecture that q^e consumers will be served (i.e. join the network). Clearly it must be that in equilibrium $q = q^e$. Hence, in principle, one could write $P(\cdot)$ as a function of q only. The advantage of rewriting inverse demand in this way is that it allows to decompose the effect of a quantity increase isolating the role of consumer expectations over network size in price formation. As usual, the monopolist chooses the quantity q that maximizes its profit $(P(q, q^e) - c)q$. It equates marginal revenues to marginal cost assuming that expectations adjust accordingly: $(P'_q + P'_{q^e})q + P = c$. This leads to the pricing equation:

$$P = c \underbrace{\overbrace{-P'_q q^*}^{\text{classic markup} > 0}}_{\text{externality discount} < 0} .$$

The first two terms are familiar. Price is equal to marginal cost plus a positive markup which reflects market power and depends on the curvature of the inverse demand function (recall that demand is negatively sloped: $P'_q < 0$). The last term captures the effect of network externalities on monopoly prices. Specifically, P'_{q^e} measures the price effect of more optimistic expectations. In other words, it measures the change in the agents' willingness to pay as a result of the increased network size. Since increasing quantity (or equivalently decreasing price) enhances such willingness to pay by increasing network size, the monopolist is more inclined to do so. Therefore, it charges lower prices. The stronger the network effects (as measured by P'_{q^e}) the lower the overall markup over price.

Source: Lear

The above observation tackles an old and important question in network economics that goes back to Liebowitz and Margolis (1994). Do monopolists internalize network effects? That is, when making their choices, do they take into account the extra value created by increasing quantity for all network participants? The answer is yes, but only up to a point. The reason goes back to the classic contribution of Spence (1975). Recall that the market price reflects the willingness to pay of the "last" consumer; that is, the consumer just indifferent between purchasing or not. So, the effect of a change in quantity (for instance, one less unit sold) on price simply reflects how much that "last" consumer values consumption. However, there is no reason why the marginal consumer should have preferences that are representative of all other consumers served. To see this via a simple illustration consider a social network. It makes sense to assume that heavy users of a social network enjoy more interacting with other users than consumers at the margin. However, if this is the case then the monopolist fails to internalize loyal customers' taste for interactions and thus provides, other things kept equal, a suboptimal quality. In analogy with Spence's work, one could think of network size as a "quality" dimension of the monopolist's product. If marginal consumers care about quality less than infra-marginal ones, then monopoly power would lead to both high prices and suboptimal quality.

While mark-ups in digital markets may be significantly lower due to network effects, there is a sense in which these markets are "doomed to fail." The idea is that because an individual's consumption choice has a positive externality on all the other consumers, in order to induce choices that maximize the overall industry surplus, one would need to charge prices below the marginal cost of production. That is, negative mark-ups. Since no firm would ever find it profitable to charge below cost, markets characterized by network effects are in a sense "doomed to fail" as there is no market structure (i.e. there is no amount of competitive pressure) that would support such an outcome. A notable exception discussed in Box A.2 below is the case of multi-sided platform markets where negative mark-ups can be supported as these losses can be recouped by charging other market participants.

Box A.2: Adoption externalities and market failure

Suppose that the economic surplus (i.e. utility) that a consumer gets is equal to some stand-alone value, denoted B , plus a component proportional to the size of the network $b \times q$, where q denotes network size. That is: $U = B + bq$. For instance, think about a web-mapping app such as Waze or Google Maps. The stand-alone value refers to the value of having maps and directions at your fingertips. The network component reflects the value of having the stand-alone utility being complemented by crowdsourced information. That could be information about real-time traffic conditions or the opening hours of local shops. Clearly, when making purchase decisions, a consumer takes into account only the *private* benefits $B + bq$. However, the *social* benefits created by having an extra consumer on board equal the private benefit plus the extra surplus that all *other* consumers would get due to the increased network size minus the cost of serving that additional consumer. Thus, when joining, consumers exert a positive “adoption externality” on all other customers as they increase the payoff of others.

A basic consequence of adoption externalities is that even if the price were set at marginal cost (in short mc), the outcome would still be inefficient from a total surplus maximizing perspective. To see this, firstly observe that consumers adopt if and only if $B + bq$ is not lower than the price $p = mc$. The “last” consumer adopting is just indifferent as his private benefits are exactly equal to the cost of serving that consumer. However, if this consumer were to join, the overall surplus would exceed the cost of serving that consumer. Thus, even if $p = mc$, there is suboptimal adoption. In other words, there is scope in these markets for *below* marginal cost pricing. The stronger the network effects, the wider the gap between cost and price that would restore efficiency. If one considers consumer surplus (as opposed to total surplus) as the relevant welfare measure, then prices should be even lower as, in that case, the losses incurred by the platform drop out of the equation. In the plausible case with very small marginal costs (a characterizing feature of many digital markets), then efficiency would warrant *negative* prices.

Source: Lear

Market power with indirect network effects

Next, consider multi-sided markets. A first difference is that adoption externalities due to network effects go *across* sides. As in the one-sided settings, platforms can use prices to account for that, making consumers internalize those externalities. However, assuming a platform is able to discriminate and, therefore, charge different prices to agents belonging to different sides, the problem is more complex. A side-specific price plays a double role here. On the one hand, it allows to extract rents as in traditional settings. On the other hand, by shaping consumption choices on that side, it ends up affecting the value that agents place on joining the platform on *other* sides.

For concreteness, we start by outlining the nature of market power in the simple context introduced above with one platform and constant marginal costs. The only difference here is that network effects are indirect. It is convenient to frame the platform’s problem as that of choosing how many consumers to serve on each side; in other words, the platform has to choose a pair of quantities. Total revenues are equal to the sum of the revenues on each side. This problem is similar in spirit to the classic problem of a multi-product monopolist. When choosing whether to serve an extra agent, firms typically trade off price (lower price for all units sold) for quantity (one more unit sold). However, one less unit sold also *changes* the price that agents are willing to pay on *other* sides. That is, the monopolist also takes into account how much value is created (or destroyed in the case of negative network effects) on other sides. Thus, other things equal, indirect network effects induce *smaller* mark-ups if externalities are positive and *larger* mark-ups otherwise. Box A.3 formalizes this point.

Box A.3: Indirect network effects and mark-ups

Let $P_i(q_i, q_j^e)$ denote the inverse demand. That is, the price that q_i agents of side i would be willing to pay if they expected q_j^e agents on side j to materialize. The monopolist problem is:

$$\max_{q_A, q_B} P_A(q_A, q_B^e)q_A + P_B(q_B, q_A^e)q_B - mc_A q_A - mc_B q_B$$

As usual, the monopolist equates marginal revenues to marginal cost on each side assuming that expectations adjust accordingly. Taking the derivative of the above and rearranging leads to the pricing equation:

$$P_i = mc_i \quad \overbrace{-\frac{\partial P_i}{\partial q_i} q_i^*}^{\text{classic markup} > 0} \quad + \quad \underbrace{\frac{\partial P_j}{\partial q_i^e} q_j^*}_{\text{cross-subsidy for value created on side B}}$$

The first two terms are familiar. Price is equal to marginal cost plus a positive markup which reflects market power and depends on the curvature of the inverse demand function. The last term captures the effect of network externalities on monopoly prices. If externalities are positive and strong, then the last term could overcome the second and below cost pricing might occur.

Source: Lear

When participation on one side exerts a positive and sufficiently large (in relative terms) externality, then mark-ups could well be negative: sides that create a lot of value for other sides should be subsidized. This means that platforms can sometimes increase profits by making losses on one side while recouping those losses on other sides. An example is a content provider (say a news outlet) financing operations through advertising. If advertisers care more about the number of consumers that can be reached than consumers care about the quantity of ads, then we would expect consumption to be subsidized (perhaps with a negative or zero price). A key insight is that negative mark-ups or prices are by no means an indicator of low market power as one should evaluate all sides simultaneously.

To further gain insights on the nature of market power, the earlier literature (e.g. Rochet and Tirole (2006)), spelled out the problem of a monopolist as a combination of two sub-problems. A first problem is, given a total price, how to allocate that price across the two sides. A second problem is how high that total price should be. That is, platforms need to pay attention both to the overall price *level* and to the price *structure*. As in the one-sided setting the monopolist has an incentive to choose prices that mitigate the effects of the adoption externalities across groups. In loose terms, it aims to get both sides “on board”. So, while market power clearly translates into high price levels, the incentives towards the price structure can be aligned. That is, there is not necessarily a wedge between the private (profit maximizing) and social incentives over the price structure. The intuitive reason is that monopolists capture a fraction of the surplus created in the market, so they obviously have an incentive to increase the size of that surplus. The higher the overall interaction surplus, the larger the monopoly rents, which are a fraction of that. The point that the price structure matters is formalized in Box A.4.

Box A.4: Price structure in two sided markets

Let i and j index sides and suppose that the economic surplus that an agent from side i gets is equal to the sum of a stand-alone benefit B_i and a per interaction benefit that increases with the quantity of agents on the opposite side $b_i \times q_j$. That is $U_i = B_i + b_i q_j$. From the consumers’ perspective, B_i is the quality of content while b_i is the marginal value (perhaps negative) of advertising. From the advertisers’ perspective, B_j is the value of one’s product being associated with this particular content provider (e.g. “as seen on TV”) and b_j is the expected present value of informing an additional consumer about the existence of a product. A textbook example is that of a pub where men and

women hope to find a partner. B_i is then the value of enjoying a drink in a laid down environment while b_i is the value of having one more potential partner entering the bar.

Perhaps the simplest way to show why the price structure matters is to forget about profit maximization for a moment and look at the simple benchmark where prices are set equal to the respective marginal costs, that is $p_i = mc_i$ and $p_j = mc_j$. Would total surplus be maximized? Once more, the answer is no. Again, the reason is that agents do not internalize the basic economic fact that their choices affect the utility of other agents. In particular, when making their adoption choices, they compare their *private* benefit $U_i = B_i + b_i q_j$ to the price, neglecting the fact that an extra agent on side i changes the surplus of all agents on side j by an amount equal to b_j . The “last” agent served on each side is just indifferent, equating her *private* benefit to the *social* cost of serving that agent mc_i . Thus, if indirect network effects are positive, below marginal cost pricing on at least one side would also be warranted in this context.

So far, no difference with the one-sided setting. However, here one may ask whether it would be possible to increase total surplus by changing the prices in a way that keeps profits equal to zero. That is whether it would be possible to increase the total surplus by making losses on one side while recouping those losses on the other side. The answer to this question is typically yes. To see this, suppose that $b_i < b_j$, so that agents of side j care relatively more than agents of side i about interacting with agents of the opposite side. To simplify the argument let everything else be symmetric on the supply and demand sides. That is let $mc_i = mc_j = mc$. Now, consider starting from a price of $p_i = p_j = mc$. Can one increase the total surplus without incurring losses? Clearly, since $b_i < b_j$ one possibility would be to drop one customer on side j (which is not particularly appreciated by customers on side i) and attract one more customer on side i . Whether this would be profitable depends on how much it would cost to attract an extra i agent (that is how much should the price p_i be lowered) defrayed by the extra revenues on side j due to above marginal cost pricing. Thus, whether this would be profitable ultimately depends on the relative curvature of the demand functions. However, in a symmetric setup, these two would cancel out. As the total number of agents served does not change, the total cost would stay constant, while $b_i < b_j$ implies that the total surplus would obviously go up. Therefore, the assumption that $b_j > b_i$ suffices to establish that, in first best, side i should be subsidized (i.e. pay a price below cost), while side j should be taxed to recoup those losses. Notice that if $p_i = c - b_j q_j$ then side i agents would fully internalize the adoption externality. That is the marginal agent on side i would equate social benefits to the social costs. This approach captures an intuitive result in this literature, which is that sides that create a lot of value for other sides should be subsidized. If b_j were very large, then p_i could well be negative. In the examples above, if advertisers’ care more about consumers than consumers care about advertisers then we would expect consumption to be subsidized (perhaps a negative or zero price). Similarly, in the pub example, if men care about “interacting” with women than women care about “interacting” with men then the pub owner should subsidize women (say allowing them for free) and charge men.

Source: Lear

Market power in dimensions other than price

Platforms perform their “balancing act” through other instruments besides prices. They also make a number of “design” choices that shape economic interactions. Most notably, they design the technology that allows users to interact. From a public policy perspective, one may wonder if concentration can also lead to suboptimal “design” choices. This section reviews the literature that characterizes the dark side of concentration in dimensions other than prices typical of digital markets.

The economic literature has looked at the concept of “intermediation bias,” whereby the platform uses its technology to “direct” user interactions. For example, search engines provide a ranked list of websites and advertisers relevant for a given query; social media filter content in a way that affects user engagement; e-commerce websites and OTAs, upon being queried, provide a subset of products and services related to the user query and contextual information. Some of these behaviours have already been sanctioned by antitrust authorities such as Google’s promotion of its own subsidiary websites in the Google Shopping case. One of the earlier contributions on this issue is Hagiu and Jullien (2011). They show that an intermediary has an incentive to “lower” the quality of the interaction provided by the platform in exchange for higher revenues per interaction. In their model the platform trades off revenues per interaction for quantity of interactions. In a series of papers, De Corniere and Taylor (2014, 2016) study the determinants of such bias and its consequences. The first paper looks at search engine bias and its effect on websites’ strategies. The latter generalizes some of the ideas, looking at an intermediary who is willing to divert uninformed consumers in exchange for a price. It is shown under what conditions on preferences and technology a market failure arises. Bourreau and Gaudin (2018) and Calvano and Jullien (2018) look at biases within widely used recommender systems. These are algorithms designed to greet consumers landing on a website with personalized recommendations about goods from the catalogue that they might enjoy or need. Netflix, Amazon, Spotify and many other platforms employ a version of these highly sophisticated algorithms which basically use big data to predict consumer tastes. Recommender systems are extremely popular because they help boosting consumer engagement, a key driver of business retention and creation. Bourreau and Gaudin (2018) look at the issue of biased recommendations in a context where some products/consumer choices are more profitable than others. They explore a trade-off whereby distortion enhances revenues (given participation) but obviously depresses demand as consumers anticipate that the content is not the one that they would have chosen for themselves. Calvano and Jullien (2018) show that recommendation bias is very robust, emerging even in settings where there are no pecuniary incentives. That is, even in contexts where the service provider has no preference over which object ends up being consumed. The idea is that consumer trust in these recommendation systems is very fragile. If a product recommendation (say a movie) turns out to be wrong, then consumers will not trust anymore these recommendations in the future and as a result their willingness to pay will be lower. They show that in these contexts recommender systems engage in inefficient risk taking: they are excessively cautious. That is, they recommend too often products which on average do not risk disappointing.

A.1.2. Competition FOR the market

If network effects are strong and the products provided by competing platforms are close substitutes, then concentration would be intuitively both the outcome of competition and socially desirable. Indeed, most of the current academic debate takes as given that network effects lead to market tipping and looks at the potential of competition *FOR* the market to discipline incumbents. The idea is that in a world with rapid innovation, potential and actual entry possibly mitigate the social costs of market power.

The main aim of this section is to discuss some recent work on the notion of “incumbency advantage”. That is the idea, illustrated below, that an installed base of consumers may prevent entrants from penetrating the market despite better products.

To understand what “incumbency advantage” means, consider the following prototypical situation, reminiscent of many digital markets. There is a monopolist with 10.000 customers who derive the equivalent of 50 dollars of surplus from interacting with the other 9.999 customers. Now, suppose a potential competitor appears on the market. The competitor is endowed with a better technology in the following sense: if all consumers switched, their willingness to pay would be strictly larger than 50 dollars. Biglaiser et al. (2018) say that there is an incumbency advantage whenever the entrant *fails* to conquer the market despite its superior technology. Some early contributions (discussed below) refer to this as “excess inertia.”

The three key policy questions in this context are: what is the *source* of the incumbency advantage? How and to what extent can such advantage be *exploited* to extract supra competitive rents? Are there factors that can mitigate the anticompetitive potential of network effects?

Switching costs as a competitive asset

Three important early contributions by Farrell and Saloner (1986), Katz and Shapiro (1992) and Fudenberg and Tirole (2000) pointed at switching costs. In its simplest incarnation, the idea is that once a consumer makes a purchase, she cannot change her mind. That is, consumers adopting earlier technologies are “stranded” in case a new, perhaps superior technology arises at some later stage. Switching costs and more generally “stranded” consumers are an obvious source of incumbency advantage. Importantly, they also imply a different normative benchmark in which entrants need not necessarily conquer the market. The intuition is that if entrants can only offer marginal improvements in quality, it would be more efficient to stick to the old technology. This would allow to save on switching costs while at the same time fully exploit network effects. Following this logic, Farrell and Saloner (1986), Katz and Shapiro (1992), among others, show that there could be *excessive momentum*. That is, incumbents are displaced “too often” from a total surplus maximizing perspective. The intuition is that consumers coming in at a later stage fail to internalize the utility of the “stranded” ones. So, when making their adoption choices they jump too often onboard the entrant. Fudenberg and Tirole (2000) follow up on this thread by looking at the incumbent’s incentives pre-entry. They show that switching costs induce incumbents to be aggressive early on. The idea is that establishing a wider user base deters entry of potential competitors in future stages.

While switching costs clearly played an important role in the early development of software, hardware and Telco’s industries, today’s digital markets are usually characterized by very low switching costs. Subscribing to a service, installing an app or signing up on a website does not require to invest in new equipment or sink in time to learn new skills. With the exception of personal data,²⁰⁶ these frictions are very low. Therefore, the more recent literature has been relooking at the incumbency advantage issue in this frictionless context. Early on, Katz and Shapiro (1994) pointed to “established reputations, well-known brand names, and ready visible access to capital”²⁰⁷ as potential other sources of an incumbency advantage. However, these would be a competitive advantage in any industry. The only reason why they would be more relevant in a context with network effects is that tipping is more prevalent.

Favourable expectations as a competitive asset

A common theme in recent work is to look at consumer “coordination” (or lack thereof). To fix ideas, consider the following situation. A competitor with a slightly superior technology (in the sense described above) wants to challenge an incumbent. The entrant is a subsidiary of a large firm with a well-established reputation and the services offered are very similar to those of the incumbent. There are no switching costs and the price offered by the entrant is not higher than that offered by the incumbent. This situation seems to better capture the current landscape (of course up to the assumption of higher quality) with several firms failing to displace incumbents despite deep pockets, established reputation, famous brands and frictionless switching. For instance, Microsoft’s efforts to challenge Google in the search engines market; Google’s effort to challenge Microsoft in office productivity apps or Google’s effort to displace Facebook in social networking. In this situation, from a collective standpoint, all consumers would be better off migrating to the entrant. The only reason why an entrant might fail to conquer the market is because of a widespread belief that not enough consumers will migrate. That is everyone believes that all the other consumers believe that no one will migrate. In multi-sided markets this issue is exacerbated. For instance, unestablished OS developers (e.g. Windows phone OS) need to persuade simultaneously consumers and app developers. They thus face a “chicken and egg” problem, with consumers’ waiting for app developers to join and app developers waiting for the OS to gain market shares so as to recoup their investments.

Can these “beliefs” be thought of as strategic assets (“coordination capital”) that shield incumbents from competition? What strategies will firms use in order to build or exploit this comparative advantage?

To tackle these issues, Caillaud and Jullien (2003) and, more recently, Halaburda, Jullien and Yehezkel (2016) and Halaburda and Yehezkel (2016) developed the notion of “focality”. That is, they explicitly formalize the intuition that incumbents face favourable beliefs. They are motivated by the observation that big market

²⁰⁶ Personal data can be useful to an entrant to provide comparable quality and therefore may be a source of switching costs.

²⁰⁷ Katz and Shapiro (1994), p. 107.

players are typically expected to dominate the market in future interactions. For example, the pre-orderings of new vintages of iPhones often beat expectations despite the lack of apps that exploit its new functionalities. By pre-ordering such a product, consumers basically bet that Apple would remain dominant and thus that there would be a flurry of apps for the new device. An incumbent is “focal” if consumers make their choices conjecturing that all other consumers will not switch. It can be easily shown that in a static (one shot) model of competition for exclusive services between a relatively inefficient “focal” incumbent and a “non-focal” entrant, the incumbent conquers the market “too often”. The reason is that the only way for the entrant to gain market share is to make it a dominant strategy for consumers to migrate. That is, consumers should find it convenient to migrate no matter what other consumers do. Thus, the only way an entrant can gain market share is by offering additional stand-alone (i.e. network independent) services or by charging relatively low (or, if possible, potentially negative) prices. Clearly the entrant would be willing to invest resources to induce consumers to switch only if it expects to recoup those investments in the future. Therefore, entrants will find it profitable to conquer the market only if the quality gap is large enough. This leads to the static inefficiency whereby some higher quality entrants might fail to conquer the market.

Halaburda, Jullien and Yehezkel (2018), Halaburda and Yehezkel (2016) and Biglaiser and Cremer (2018) recently relooked at this issue embedding dynamic considerations. They look at competition between an incumbent and a sequence of potential entrants over a large number of periods. They wonder whether the fact that current success brings focality (and thus future incumbency advantage) could give the entrant an incentive to invest (i.e. incur losses) in the short run to harvest rents in the future. Persuading consumers in the face of unfavourable beliefs is costly but on the other hand allows to recoup those investments through monopoly prices thereafter. Clearly, relative to the static model discussed above, entrants should be willing to invest more (i.e. incur larger losses) in the short run to conquer the market. These papers deliver two clear messages. First, they generally show that the static inefficiency extends to the dynamic setting: focal, lower quality incumbents can stay dominant. Thus, long-term considerations do not necessarily restore efficient outcomes. In particular Halaburda, Jullien and Yehezkel (2018) show that this inefficient outcome occurs when firms are not very patient. Biglaiser and Cremer (2018) further show that the inefficiency is considerably mitigated. Specifically, they show that the incumbent has little ability to leverage its focality advantage to gain rents beyond the rents they would get in a static (one-shot) interaction. The reason is that precisely for these long-run considerations, entrants become very aggressive, charging very low prices thus competing away the dynamic portion of the monopoly rents.

Biglaiser, Cremer and Veiga (2018) identify a different source of incumbency advantage: the incentives of consumers to wait until the entrant’s user base is large enough. In their model, consumers do not choose simultaneously whether to migrate to the entrant. Instead, at every point in time, an opportunity to migrate arrives with some positive probability. This equilibrium model captures a well-known fact in the industry, which is consumer reluctance to join entrant platforms early on. Being an “early adopter” comes at the cost of giving up the network effects linked to the incumbent’s larger user base. However, their reasoning goes, if every consumer waits for the others to join first, the entrant will find it difficult to penetrate the market despite providing higher quality. To separate this source of incumbency advantage from the “belief-based” one presented above, the authors assume favourable beliefs *for the entrant*. That is, when making their choices, consumers conjecture that all other consumers would migrate as soon as given the opportunity to do so. Yet, despite these beliefs, waiting for those consumers to join first can be optimal, leading to suboptimal adoption. Furthermore, they link the inefficiency to the way consumers become aware about the existence of the entrant.

How do indirect network effects change the nature and outcome of competition? Caillaud and Jullien (2003) and Jullien (2011) show that the static inefficiency due to “focality” or “coordination bias” extends to multi-sided markets. In these papers, “focality” means that agents on one side expect agents on the opposite side to stay with the incumbent. For instance, think about a classic textbook example of a two-sided market like that of videogames. Even though new entrants, such as Microsoft Xbox, might bring to the market a more powerful hardware solution, conquering the market at the expense of incumbents (at that time Sony PlayStation) is still hard under unfavourable expectations. The idea is that if game developers expect consumers to stick with Sony then it would be difficult for Microsoft to persuade them to develop titles for

the new console. Similarly, if consumers expect game developers to stick with Sony, then they would be reluctant to buy a console that they expect will not carry many titles.

An interesting additional insight of these early models of two-sided platform competition is that the presence of multiple sides *reduces* the focality advantage because it allows to employ “divide and conquer strategies” (Caillaud and Jullien (2003)). That is, the entrant needs only persuade (perhaps heavily subsidizing) one side of the market to switch. Once one side is effectively “on board” the other side will follow. Strictly speaking, this is a consequence of the fact that in a two-sided context a platform can discriminate among agents belonging to different sides. Another consequence of “divide and conquer” strategies is that they greatly reduce the extent of market power. The reason is that competition to secure one side of the market (i.e. the “divide” part of the strategy) tends to be very aggressive, forcing firms to give away a large portion of their rents to users through generous participation subsidies.

Factors mitigating the anticompetitive potential of network effects: local networks and contingent prices

A number of papers noted that network effects are often “local” and not “global” in nature (for instance Banerji and Dutta (2010)). That is, consumers typically care only about the adoption choices of other users they want to interact with. For instance, in communication networks, what matters is which service providers friends and acquaintances choose to subscribe to.²⁰⁸ Similarly, in software industries, the utility to a user of adopting a particular software and thus a particular file format depends on how many other *collaborators* of that user adopt the same software. Local network effects allow for multiple firms to cohabit in the marketplace at the same time. Also, they make a hypothetical entrant’s task much simpler.

There is a vast literature on network effects and pricing of network goods. The idea is that entrants might be able to persuade reluctant consumers by either compensating them (i.e. low or negative introductory prices) or by insuring them against coordination failures. That is by charging prices contingent on network size. On the one hand, these instruments may potentially reduce the incumbency advantage. On the other hand, incumbents might react by charging even lower contingent prices to retain their user base. Weyl and White (2018) consider the problem in the context of a multi-sided market. They show that competition in “insulated tariffs” sometimes leads to inefficient fragmentation (too many firms active at the same time) and never leads to excess tipping.

Factors mitigating the anticompetitive potential of network effects: multi-homing

In digital markets, switching costs are typically low for a variety of reasons. As noted by Evans (2017), Internet platform businesses typically leverage on OSs for non-core software and hardware functionalities. In contrast with classic network industries, users do not have to make capital investments to access other service providers. For example, switching one’s social network does not require buying a new device or learning to operate in a different OS environment. Moreover, usage costs are typically low. In many instances, the products are distributed for free. Consequently, users typically try out new services *before* quitting the old ones and patronize two competing platforms at the same time. This behaviour, usually referred to as “multi-homing”, is the norm more than the exception in digital markets. This simple fact has deep consequences. Clearly, the “rich get richer” argument introduced earlier assumes that the opportunity cost of switching to an entrant is giving up the network of the incumbent. This implicitly presumes some friction that does not allow consumers to stay hooked up to both networks at the same time. Without that friction, it is obviously easier to induce consumers to “try out” one’s product.

One key distinction put forward by Biglaiser et al. (2019), among others, is whether network effects result as a by-product of consumer *signing up/ installing* on an app or *using* that app. To see why this distinction is crucial, Biglaiser et al. (2019) contrast communication services with social networks. What matters for the success of a communication service is its network. For instance, if a user installs both WhatsApp and Telegram, then she can be reached through either app. On the contrary, social networks on the one hand

²⁰⁸ Intuitively, the smaller the circle of friends and acquaintances the average consumer is interested to reach, the more the network effects characterizing the industry will be local in nature, as observed by the Commission in its *Microsoft/Skype* decision discussed in section I.4.1.1.

need their users to “sign up” while on the other hand they also need them to curate their profiles and engage with the service. That is what some refer to as “multi-homing in usage”. If usage is costly (for instance, since curating one’s profile is time-consuming), then the mere act of multi-homing does not change the fact that in practice consumers still use one app.²⁰⁹ That is, for what concerns competition, they are single-homing. An illustrative case in point is Google+, Google’s “me too” social network. Despite Google easily signed up all of its Google account holders, the network has been eventually discontinued due to lack of engagement.

How does the option of multi-homing affect the incumbency advantage? Absent switching costs, there could still be scope for incumbency advantage through focality. The option of multi-homing clearly does not wipe out the focality advantage. However, it makes the marketplace much more contestable. To see this, notice that in the simple theory discussed above, in order to penetrate the market, an entrant needs to guarantee to early adopters a value at least as high as that offered by the focal incumbent. However, with multi-homing, switching occurs whenever the entrant offers non-negative surplus. That could be achieved via negative prices or by bundling the network good with some complimentary service. Indeed, many online platforms offer several freebies (Gmail in Google, news in Yahoo, Messenger in Facebook) to keep their users hooked up.

This reasoning suggests that policies encouraging the extent of multi-homing should increase market efficiency, although more research is needed.

Multi-homing has been mostly studied in the context of platform competition. Armstrong (2006), studied competition in a model where one set of users always multi-homed while the other was assumed to single-home introducing the well-known notion of “competitive bottleneck”. To see what that means through an example, consider marketplaces such as Amazon.com or Taobao.com. Suppose, for the sake of illustrating the notion, that there are two or more competing marketplaces and that buyers single-home. That is, they always shop on their preferred website. Then, given consumer behaviour, platforms become the only means through which sellers can access the buyers. Thus, given buyers’ choices, platforms can insist on sellers paying the monopoly price for accessing their exclusive turf of buyers. Basically, single-homing on the buyer side shuts down competition on the seller side. To make this more concrete, notice that if buyers segregate in a platform of their choice then a seller’s choice of joining one platform (say Amazon.com) does not depend on whether it joins some other Taobao.com. Since the user bases do not intersect, the two choices are separate. But since acquiring buyers allows to extract fat monopoly rents on the opposite side of the market, there will be fierce competition for buyers. Armstrong (2006) concludes that we should observe relatively lower prices (even negative ones) on the single-homing side of the market.

The more recent literature on multi-homing recognizes that the choice to multi- or single-home is often endogenous. Firms can control some of these choices by designing their offers in a way that induces their preferred outcome. The first paper along these lines is Armstrong and Wright (2007). They show that the competitive bottleneck outcome arises endogenously if one side of the market (in their paper, sellers) sees the platforms as homogeneous (of course controlling for the size of the network) while the other side of the market (buyers) has strong preferences for using one particular platform over the other, i.e. there is horizontal differentiation. On the contrary, two-sided single-homing is the natural outcome when agents on both sides have strong preferences. In a similar vein, Tremblay and Jeitschko (2018) characterize competition between platforms in two-sided markets allowing both types of agents to multi-home. In contrast with Armstrong and Wright (2007), they look at a different source of demand heterogeneity. In their model agents differ on how much they value interactions. That is, they look at the effect of heterogeneity in the indirect network effect b_i . The paper basically maps consumer preferences (thus demand) and firm technology (thus supply) to platform market outcomes. This model is able to rationalize a wider spectrum of market outcomes. In particular, they provide conditions under which mixed-homing equilibria arise, with some sellers and some buyers dealing with both platforms while others single-homing.

²⁰⁹ This key distinction is one of the factors that made the Commission reach different conclusions about the mitigating potential of multi-homing in past merger decisions regarding consumer communications services, on the one hand, and social networks, on the other hand. These cases are discussed in section I.4.1.1 and I.4.2.1 respectively.

An important means through which multi-homing can be effectively hindered are exclusive dealing arrangements. If a firm unilaterally insists on exclusivity on one side of the market, then multi-homing outcomes are obviously ruled out. But can a platform profit by doing so? What about end-user surplus?

Armstrong and Wright (2007) look at this issue when platforms are *not* differentiated. They show that two identical platforms can cohabit despite being perfect substitutes if one side of the market multi-homes. They show market outcomes where all sellers join both platforms while buyers divide equally between platforms (a similar insight can be found in Caillaud and Jullien (2003)). Again, being this a competitive bottleneck outcome, competition on the seller side is shut down, so their surplus is fully extracted. On the other hand, buyers are subsidized. In extreme cases, all surplus extracted on the seller side of the market is given back to buyers under the form of low prices attempting to persuade them and profits are zero. They show that the effect of allowing for exclusive contracts is that of inducing market tipping. As discussed, on the one hand this development leads to static efficiencies. Since the two platforms were identical to start with, if there is even a small cost that sellers have to bear to multi-home, then one big platform is obviously more efficient. On the other hand, it creates dynamic inefficiencies due to the incumbency advantage.

Peitz and Bellaflamme (2018) look at this question with a model that allows for idiosyncratic tastes on both sides of the market. They contrast outcomes in the competitive bottleneck world (in their model, sellers multi-home while buyers single-home) with outcomes in the two-sided single-homing world (sellers and buyers single-home). To see how a platform can gain by having sellers sign exclusive deals notice that in the competitive bottleneck world the possibility of exploiting those valuable multi-homing sellers builds a lot of competitive pressure to bring buyers on board. Exclusive contracts help raise profits as follows. On the one hand they create competitive pressure on the seller side. On the other hand, they relax competition on the buyer side. This is profitable if what you give up (i.e. monopoly rents on the seller side) is less than what you get (larger duopoly rents on the buyer side). Indeed, they show that platforms prefer to impose exclusivity to sellers if, other things held constant, the sellers' stand-alone benefit value is small enough.

Carroni et al. (2018) look at platform competition in a context where some users (say a superstar music artist or a blockbuster movie) are more valuable than others. Signing these superstar users on exclusive terms provides a competitive advantage. Of course, these contracts are somewhat expensive since platforms need to compensate superstar users that cannot interact with the consumers of the rival. They show that exclusive contracts arise endogenously whenever the platforms products are close substitutes. Also, and most importantly, exclusive contracts can be procompetitive as they induce more content providers to multi-home and therefore increase the overall content consumption, despite reducing competition downstream.

A.1.3. Competition IN the market

Here we complement the analysis on competition highlighting two notable cases widely discussed in the literature, where there is competition IN the market *despite* network effects: network interconnection and product differentiation. What links these two is the fact that market fragmentation is not necessarily inefficient to start with. This is linked to either consumer preferences or technology.

Two networks/customer bases are said to be interconnected if their respective members can interact. Under interconnection there is obviously no more network-driven scope for tipping. Indeed, the earlier literature on network effects has focused on the issue of compatibility and interoperability as a way to restore competition in the market while preserving network effects (a good starting point is Laffont and Tirole (2001)). A textbook example is termination in Telcos. Taking mobile operators as an example, customers of operator A can call customers of operator B if there is an agreement between the two on call termination charges or if termination is regulated.

Compatibility and interoperability are not perceived as a viable option in today's digital markets arena. One reason is that interoperability requires an agreement on what standard services should be guaranteed to consumers served by different firms. While it is reasonable to think about agreements detailing what a telephone call "is" and what quality means in that context, it is much more difficult to do so in the context of social media or enhanced communications services such as WhatsApp or Instagram.

A notable exception to the view that compatibility is not an option is a recent contribution by Gans (2018). The paper puts forward a notion of “identity portability” as a possible policy response. The idea is that individual users should have a “right” to their identity and to its verification if they change digital platforms. The idea is that if a user wants to interact with some other users whose identity is clearly defined, then platforms should allow that interaction by sorting out some way of interconnecting the user bases mitigating switching costs and promoting competition. A similar proposal, labelled “graph portability”, has been put forward by Zingales and Rolnik (2017).²¹⁰

If products are sufficiently differentiated, then two or more platforms could obviously cohabit. Consumers with tastes “very close” to an entrant’s product will choose that over an incumbent despite the incumbents’ installed base. That is, if the extent of horizontal product differentiation is large enough relative to the strength of network effects then the natural tendency to tip can be overcome. Armstrong (2006) and Rochet and Tirole (2003) look at fragmentation/shared market equilibria in two-sided markets. Analogously to the one-sided settings, they show that if platforms differentiate their products, catering to different idiosyncratic tastes, then two or more platform can cohabit in the same market much as in traditional ones. However, despite the absence of tipping, network effects still play an important role in shaping prices and outcomes. For instance, a key insight of Armstrong (2006) is that network effects intensify competition. Stealing business from a side of a rival carries a double dividend. On the one hand, it makes the platform more attractive to all consumers on the opposite side, inducing some consumers to switch. On the other hand, it reduces the rival’s attractiveness (whose network shrunk), inducing even more customers to switch. Stronger network effects amplify this channel, greatly limiting the extent of rent extraction as compared to traditional industries. That is, indirect network effects *amplify* the effect of competition on prices. The larger the externalities, the lower the prices charged.

Market fragmentation is not surprising nor necessarily inefficient in settings where consumers disagree as to what is the “best” product due to their own idiosyncratic tastes. Some recent contributions showed that fragmentation can occur *despite* consumers agreeing on which platform provides the “best” service (Ambrus and Argenziano (2009)) and despite consumers perceiving the two platforms as providing identical services (Calvano and Polo (2018)). Ambrus and Argenziano (2009) look at a context in which some consumers value interacting more than others. In jargon, they look at the effect of heterogeneity in the indirect network effect b_i . In order to understand their argument, it is useful to draw a parallel with a seminal contribution by Mussa and Rosen (1978) and Shaked and Sutton (1982). These papers endogenize the quality of a consumer product, allowing firms to endogenously provide different “qualities” or “versions” of the same product. Shaked and Sutton (1982) show that if consumers carry different tastes for a marginal increase in “quality,” then identical competing firms can successfully relax competition by serving different subset of consumers. They do so by endogenously differentiating in the quality dimension. One firm provides in “high quality” services focusing on those consumers who value quality a lot while the rival provides a “low-quality” product focusing on those with a low willingness to pay for quality. Ambrus and Argenziano (2009) show that one can use the “size” of the network in a way akin to quality. One of their motivating examples are job market matchmakers such as Monster.com. They document that back in 2009 the two major US platforms carried quite distinct groups of agents. One platform was basically free on the job seekers side. So, it carried a large pool of those. On the other hand, it charged a small pool of selected employers a hefty price to post a vacancy and access that large pool. The main rival platform adopted an opposite model. It had many more job postings due to lower prices on the employers’ side. However, job seekers had to go through a costlier process to post their resumes. They rationalize this and other anecdotal evidence by providing a model of competition where one platform is cheaper and larger on one side, while the other platform is cheaper and larger on the *other* side. Their argument can be seen as an extension of the classic papers on vertical differentiation once one notices that the quantity of agents on one side is the “quality” of the platform for agents on the opposite side.

Calvano and Polo (2018) go one step further providing a model of strategic differentiation by business model that does *not* rely on users having different tastes for quality but rather on the “two-sided” nature of these markets. They show that two otherwise identical platforms can relax competition by cornering different sides

²¹⁰ <https://www.nytimes.com/2017/06/30/opinion/social-data-google-facebook-europe.html>.

of the market. The motivating example are broadcasting markets, where Free-to-Air (FTA) operators cohabit with Pay-TV's. Their respective business model is to subsidize viewers (providing free content) while charging advertisers for the privilege of accessing those viewers and vice-versa. The key intuition is that business models are strategic substitutes. Loosely speaking, if one operator supplies more advertising and decreases or eliminates subscription fees (i.e., shifts towards the FTA model), it heightens its competitor's incentive to raise fees and reduce advertising (moving towards the Pay-TV model), and vice-versa.

A.2. Markets for attention

A large number of digital products and services are offered free of charge to consumers and paid for with advertising dollars. In the US alone, the internet advertising industry totalled revenues of almost \$90 billion in 2017, with growth rates in the double digits. These firms include the top online businesses. Indeed, 7 of the 10 most visited websites in the US²¹¹ are in the business of harvesting attention by means of content or service provision and resell it to advertisers. Some refer to these firms as "attention brokers". The industry is highly concentrated. For instance, the top 10 online platforms get almost three quarters of all online advertising revenues.²¹² Wu (2018) describes and supports the approach of considering platforms reselling attention as being in the same market regardless of their "functional definition" (e.g. search engine) as a way to address the "blind spot" in current Antitrust practice.

Attention brokers are essentially platforms operating in multi-sided markets. Advertisers wish to place their creatives on outlets that have a large audience. Thus, their willingness to pay increases with the number of eyeballs the platform attracts. However, consumers' willingness to pay typically decreases with the amount of advertising supplied. That is, advertising is often seen as a nuisance. So, at first pass, the literature on multi-sided platforms surveyed in previous sections already provides a number of insights on the functioning of these markets.

However, these markets received a special treatment in the economics literature for a number of reasons that go beyond their obvious relevance:

- human attention is a scarce and valuable resource and thus one naturally wonders if the market is inducing any allocative distortions;
- the fact that prices are often not used on the consumer side of the market creates new theoretical and empirical challenges. Competition for eyeballs is in the quality dimension and the absence of price variation makes it hard to estimate the demand system and thus to measure substitutability, which is key in merger cases;
- new technologies allow advertisers to "target" audiences in a number of dimensions: demographics, physical location, time of the day, personal tastes, browsing history and so on. These "new media" are different than "traditional media". Targeting means that competition is scaled at the individual level. In extreme cases, one can think of the attention of a single, identified individual being first contended between media outlets and then auctioned off;
- because multi-homing is a widespread phenomenon, traditional supply-side market shares are not informative of the extent of competition;
- advertising is a key input in product market competition. Thus, the functioning of the advertising markets has consequences for product markets as well.

An early and influential contribution by Anderson and Coate (2005) provided a first model of "competition" for attention. Specifically, they study the allocative properties of a market with two competing attention brokers such as free news outlets. The main focus is on the trade-off between quantity of advertising and number of viewers. Would competing platforms over-supply or under-supply advertising? What is the likely effect of a merger? A key modelling assumption is that the stations compete for the *exclusive* attention of viewers. That is, viewers have to choose where to get their news and cannot patronize both websites. Thus,

²¹¹ <https://www.alexa.com/topsites/countries/US> last accessed in January 2019

²¹² Silverman, David. 2017. "IAB Internet Advertising Revenue Report." PwC.

their model is a special case of the competitive bottleneck model studied before with one less control (consumer price).

Comparing the duopoly outcome with the choices of a hypothetical monopoly owner of both stations, they find that a merger leads to an *increase* in the quantity of advertising. This is very intuitive. Notice that, being a nuisance, advertising can be thought of as some “shadow price” that consumers have to pay in order to satisfy their content needs. Competition typically leads to lower prices. Thus, competing stations reduce the quantity of ads to secure eyeballs. What about efficiency? The normative analysis is more nuanced. Because of the absence of prices on the consumer side of the market, the stations fail to internalize the effect of an extra advertisement on viewer welfare. Concentration therefore leads to inefficient overprovision.

The more recent literature recognizes that users typically satisfy their content needs on multiple platforms. For example, ComScore reports that the largest online advertising networks²¹³ serve pretty much the same eyeballs. How does the fact that competition is for *shared* users change the conclusion above? Ambrus et al. (2016) consider the incentives of a platform to provide an extra ad in this context, assuming that the platforms provide content that is not substitute. For example, think about a search engine competing with a social media. Clearly, being advertising a nuisance, when quantity goes down, the platform will lure some new users onboard. In the traditional Anderson and Coate’s model, that new business is “stolen” from the rival. In this context, the platform will instead “share” some previously unshared business with the rival. A key insight is that these shared eyeballs are less lucrative than exclusive eyeballs. This is because as both platforms can deliver those eyeballs to advertisers, competition leaves more of the rents associated to those eyeballs in the advertisers’ pocket. This is referred to as the “incremental pricing principle” in this literature. Thus, the incentives to acquire new eyeballs through lower quantity of ads or higher quality are quite different than those in traditional models. Also, concentration (for instance, through a merger) changes substantially those incentives. This is because some previously shared business becomes post-merger exclusive of the merged entity and thus more lucrative. Broadly speaking, these papers identify novel forces that reflect outlets’ incentives to control the *composition* of their customer base. The model can explain several empirical regularities that are difficult to reconcile with existing models.

Athey et al. (2018) and Anderson et al. (2016) look at a similar model with more emphasis on implications for the type of content provided rather than the quantity of ads. The starting point in Athey et al. (2018) is that advertising campaigns on multiple outlets are wasteful when consumers multi-home because some consumers are reached too many times while others are missed entirely. The reason is that while tracking technologies, such as “cookies”, allow to control how many times a given consumer has been impressed with a particular ad on a given platform, such as on Facebook.com and the associated websites, there is no way for owners of *other* platforms to know which ads a multi-homing consumer has been exposed to. Advertisers seeking broader “reach” (i.e. more unique users), while avoiding inefficient duplication, anticipate this and tend to prefer *larger* platforms to minimize waste. This has implications for content provision: publishers invest in quality to extend the number of users. Anderson et al. (2016) show, among other things, that due to the incremental pricing principle platforms may bias content against multi-homers. Gentzkow et al (2014) provide an empirical structural application in the newspaper industry. They show that preferences over one’s audience composition and in particular the fact that multi-homing readers are less valuable can explain the political orientation of hystorical local US newspapers.

Prat and Valletti (2018) look at implications of attention market concentration on product markets. The starting point is that entrants need to make consumer aware of their existence. That is, consumer attention an essential input for entrants in product markets. Clearly, incumbents may foreclose entry by buying large amounts of attention of each user for a large number of users (in the limit, by buying all attention of all users). However, this strategy is profitable as long as the number of competing attention brokers delivering individual users (and thus the quantity of advertising supplied) is not too large. A merger between two attention brokers patronized by a user reduces the supply of attention of that user and makes it easier for incumbents to keep out entrants from the market for that user ultimately hurting consumers. This finding

²¹³ An advertising network is an attention broker that serves ads on multiple websites (some of which are owned and run by independent third parties) and can track users as they move across these websites.

goes against conventional wisdom. Mergers between attention brokers indeed might have important effect on consumers via higher prices product markets. Clearly the negative effect depends on the extent of usage overlap. If two attention brokers have no user in common, there is no effect. Furthermore, it typically materializes in niche markets not served by traditional media. The paper is able to rationalize apparently puzzling behaviour such as “brand” keyword advertising, a practice used by most major corporations whereby a company advertises for keywords containing their brand, despite organic links obviously appearing on top of the page.²¹⁴ The idea is that those ads contribute to push further down competitors’ link in organic search and to keep them out from sponsored search.

A.3. Innovation in digital markets

One of the features of digital markets is rapid innovation both of the drastic type (mainly performed by entrants) and non-drastic/incremental type (mainly performed by market participants).

Start-ups often sell-out to incumbents before even serving their first customers. In section A.3.1 we review the literature on this phenomenon which is known as “entry for buyout” and that on the extreme event where acquirers discontinue the development of the new product known as “killer acquisition”.

Another important issue is whether a merger between equal sized competitors would further strengthen or dampen the incentives to innovate. The recent decision by the EU Commission in the *Dow/DuPont* case (discussed in section I.4.1.4) sparked off a debate among scholars. In section A.3.2 we review recent contributions showing that the Commission’s hypothesis, namely that mergers *hamper* innovation, is not unambiguously supported by economic theory.

A.3.1. Entry for buyout and killer acquisitions

A widespread practice in digital markets is that of entrants selling out to incumbents very early in the product life-cycle. This is known as entry for buyout (Rasmusen (1988)).

The theoretical roots of this argument go back to an early seminal article by Richard Gilbert and David Newbery (1982). They argue that institutions such as the patent system create opportunities for existing incumbent firms to maintain their monopoly power by taking pre-emptive actions meant to decrease the prospective profits of potential competitors. One such action is what they refer to as “pre-emptive invention”. They show that incumbent firms have incentives to patent new technologies before potential entrants in order to protect their rents. To see this point through a simple model, consider the following situation. There is an incumbent whose profits are π^M and a potential entrant whose profits are equal to 0. An innovation opportunity for a substitute variety of the incumbent’s product arises. If the innovation is patented by the entrant, then there will be a regime of symmetric duopoly with firms earning a profit of π^D each. If the innovation is patented by the incumbent, then the incumbent will jointly sell both varieties and earn a profit π^{JM} . The maximum willingness to invest to innovate of the potential entrant is equal to the profits he would make in case of innovation minus the profits he expects to make otherwise. That is equal to π^D . The incumbent’s maximum willingness to invest is equal to π^{JM} minus the profits he expects to make otherwise. As duopoly profits are larger than zero, it is reasonable to expect that the entrant would invest if the incumbent does not. It follows that the incumbent’s maximum willingness to invest is $\pi^{JM} - \pi^D$. The incumbent has thus stronger incentives to invest if and only if $\pi^{JM} - \pi^D > \pi^D$. That is, if and only if $\pi^{JM} > 2\pi^D$. This condition simply states that the incumbent has stronger incentives whenever the total industry profits in regime of monopoly are larger than those in regime of competition. This condition is likely to be satisfied unless there are strong diseconomies of scale. This is what in the literature is referred to as “efficiency effect”.

The above argument assumes that there is no further cost beyond patenting to bring a product to the marketplace. Now, suppose that whoever patents the innovation needs to further invest in developing it at

²¹⁴ Blake et al. (2018) report that “Google searches for the keywords “AT&T”, “Macy”, “Safeway”, “Ford” and “Amazon” resulted in paid ads at the top of the search results page directly above natural (also known as organic) unpaid links to the companies’ sites.”

cost d . Conditional on patenting, the incumbent develops the new product if and only if $\pi^{JM} - d > \pi^M$. The potential entrant develops the innovation if $\pi^D - d > 0$. If the innovation is a close substitute to the incumbent's product then $\pi^{JM} \approx \pi^M$ which implies that it is never optimal for an incumbent to develop. On the contrary $\pi^D > d$ (as otherwise the innovation would not be viable to start with). This means that if products are close substitutes incumbents have a *weaker* incentive to develop than entrants. This is Arrow's (1972) famous "replacement effect": the incentives of introducing new products are smaller for incumbents since some of those products will end up cannibalizing its own rents.

By the same logic, incumbents have stronger incentives than, say, venture capitalist, to acquire entrants in the process of developing a competing product. Once acquired, by virtue of the "replacement effect" they will also have stronger incentives to discontinue those development processes.

The possibility of buying out entrants obviously stimulates entry through innovation and thus investments. Rasmusen (1988) argues that, on the plus side, this limits the scope for entry deterrence strategies, for instance through excess capacity à la Spence (1977). To deter entry, the incumbent needs to commit to be aggressive post-entry *and* to not buy-out eventual entrants. On the minus side, entry for buyout stimulates inefficient rent-seeking duplicative innovation. For instance, because the threat to incumbents is higher when the entrant's product is a close substitute to the incumbent's then entrants will seek to duplicate existing products rather than creating new ones through diversification. Also, because entrants expect to be bought, they would enter even if expected revenues are less than investment costs, provided of course that the entrant can credibly remain in the market. This occurs whenever production costs are low, and all investments are in R&D (and hence sunk). In limited cases, the prospect of being bought out may stimulate entry of inefficient firms (for example, with higher unit costs)

In summary, from a normative stand-point allowing buy-outs reduces the scope for entry deterrence strategies and thus enhances market contestability. On the other hand, it encourages rent-seeking behaviour.

While the literature provides clear and unambiguous theoretical predictions towards pre-emptive buyouts, there is surprisingly little systematic evidence to date. This is mainly because of significant empirical challenges. Ideally, the econometrician would need to observe how much effort is put in the development phase, before and after acquisition. Also, one needs to observe how close these products would be in product space to be able to quantify the incentives to discontinue their development. Finally, as observational data clearly features non-random M&A choices, there is an endogeneity issue as potential drivers of acquisitions may confound the effect of acquisitions on project development.

An exception is a recent paper by Cunningham, Ederer and Ma (2018). These authors gain traction on the problem by looking at acquisitions in the pharma industry. Because the development of drugs is subject to stringent regulatory requirements, the authors are able to follow the development from a very early stage through to launch or discontinuation. Their dataset provides nearly universal coverage. Importantly it provides two key pieces of information. First, it contains the drug's therapeutic market (e.g. "osteoporosis") and the mechanism of action (e.g. "calcium channel antagonist"), which is used to identify substitute products. Second, it contains information on acquisitions collected from multiple sources. They find that molecules acquired by an incumbent are 40% less likely to be developed compared to those that are not acquired. Overall, the estimates indicate that 6.4% of all acquisitions in the market are killer acquisitions. They also consider and rule out a number of alternative explanations. First, they look at human and physical capital redeployments as potential confounding motives for acquisitions. The idea is that the target is not the firm's molecules but rather its human and physical assets. For instance, talented researchers (in the spirit of Ouimet and Zarutskie (2011)) or superior technologies that can be redeployed within the acquiring firm to a more fruitful use. To rule out the human capital explanation, the authors track inventors over time and across organizations using the Harvard Patent Dataverse. They show that 78% of the inventors from target firms typically move to other firms following acquisitions. Also, the productivity of the 22% staying (as measured by the number of subsequent patents authored) actually drops by 30%. To assess whether and how technologies are redeployed, the authors look at the similarities between the *new* projects of the acquiring firm and the *old* projects of the acquired firm. The idea is that some promising chemical compounds may be used to invent new drugs. To assess similarity, they exploit a measure of distance between chemical

compounds widely used in the chemical informatics literature. They find no evidence supporting the hypothesis that technologies are redeployed: new projects by the acquirer are not similar to the acquired project.

A.3.2. Horizontal mergers and innovation

The literature on market structure and innovation built over many decades over two influential early contributions by Shumpeter (1942) and Arrow (1962). The former famously argued that perfect competition comes with strings attached. Zero or low profits reduce the incentives to invest in R&D. That is, the engine of innovation is the prospect of temporary market power to reward the innovative activity. Thus, monopoly power should be evaluated by weighting its short-term costs due to high prices against the long-term benefits of more innovation. Arrow (1962) put forward the opposite hypothesis. Monopolists, because they have a vested interest in preserving the status quo have incentives to “rest on their laurels”. The reason is that by introducing new products, they would be basically cannibalizing their own rents. Competition thus spurs innovation. Gilbert and Newbery (1982) added to this debate by showing that Arrow’s point rests on the assumption that the monopolist cannot be challenged. As discussed in the previous subsection, the prospect of entry, stimulates incumbents to invest even more than potential competitors. Many papers that followed tried to reconcile these opposite views (two notable efforts in this direction are Aghion et al. (2005) and Shapiro (2012)).

Many have recently pointed out that the classic literature on competition and innovation does not really illuminate the debate on horizontal mergers for a very simple reason: a merger is not just a reduction in the number of firms. That is, the extant literature captures the effect of an increase or a decrease of competitive pressure on the innovative activity. This exercise posits that the change is symmetric across all firms. A merger instead is a different exercise. First, the exercise is not symmetric: the merged entity combines the assets and internalizes the externalities. For instance, in terms of *incentives*, the merged entity takes into account how the activity of one division affects the rents of the other. Instead, in terms of *ability*, the merged entity might have a different R&D technology. This because it can (and should) reorganize production restructuring the R&D process to fully exploit synergies and complementarities. That is, there is an effect on the efficiency of R&D. The rest of this section focuses on a number of papers that have recently contributed to this debate along these lines. We pay particular attention to a number of papers that formalized the discussion following the *Dow/Dupont* decision of the Commission.

By and large the theoretical and empirical economic literature reviewed below suggests that the unilateral effects of mergers on innovation, both of the cost-reducing and quality enhancing types, are anti-competitive. But the nature of R&D makes efficiency gains much more realistic than in traditional unilateral settings calling for additional scrutiny by the authorities rather than relegating this practice among the “efficiency defences.” See Jullien and Lefouili (2018), Denicolò and Polo (2018b) and Shapiro (2012) for recent surveys of this debate. Below we report on a number of very recent, selected papers that are at the forefront of the debate and are a good entry point to further dive into the literature.

Federico, Langus and Valletti (2017) study the unilateral “innovation effects” of a merger. That is, they look at whether, other things held constant, the fact that one merged entity can coordinate the R&D choices of two previously separated firms leads to more or less innovation. This exercise is the same in spirit as the unilateral price effects exercise in merger control. Specifically, they look at model in which N identical firms compete to bring a new product to the market. Innovation is modelled as a stochastic process. The probability of succeeding depends positively on investment. Furthermore, the ex-post rents from innovating depend on how many firms successfully innovate. The larger the number of such successful innovators, the lower the rents. Clearly, when investing an extra dollar in R&D, a firm lowers the expected return on investment of all its rivals. The intuition is that the probability of sharing the market with one or more firms goes up for the rivals, which thus get lower rents in expectation. Federico et al. (2017) then consider a merger that would transform the two separate firms in two divisions. Clearly, coordinating the R&D activity of the two divisions here means lowering the amount invested. The intuition goes through the externality discussed above which is now internalized. They also argue that the (equilibrium) reaction of the rivals would lead to more investment but not as much as needed to overturn the initial reduction. All in all, mergers reduce innovation.

Denicolò and Polo (2018a) argue that the above conclusion relies on the hypothesis that the two divisions R&D efforts do not interact after the merger. If one thinks of R&D as a process that leads to the progressive accumulation of knowledge, then keeping both division active and independent from one another will lead to a lot of duplicative invention. Even absent synergies, the merged entity should typically have incentives to coordinate the innovative activity across labs. Or in an extreme scenario, to kill one lab altogether and divert resources to the other. If having one research lab with twice as many resources is more productive than having two independent labs, then the merger will spur innovation, at least as an initial effect. Which of the two models is more realistic depends on the particular case at hand. Also, is reasonable to assume that in industries characterized by rapid innovation and sizeable R&D, the merging parties will each command a stock of knowledge that they would share post-merger. In turn, this inevitable sharing of technological knowledge typically leads to higher incentives to invest.

As with the literature on unilateral price-effects, sufficiently strong efficiency gains or positive spillovers may overturn this finding. However, in this context, things are somewhat different. Denicolò and Polo (2018) argue that the fact that the “efficiency gains” are more realistic in these highly innovative industries, suggests that their existence should be taken explicitly in consideration by the authorities as opposed to instead relegating them as mere efficiency defence.

Bourreau, Jullien and Lefouili (2018) also challenge Federico et al. (2017)’s conclusion that concentration hampers innovation. They build a model in which the main objective of the R&D effort is to “escape competition”. That is, when one firm innovates, say by creating a new differentiated product, it moves *away* from its rivals in product space thus relaxing competition. This kind of innovation *increases* the demand of one’s rivals. Thus, the innovation externality is positive: when investing, a firm does not internalize the *positive* impact of that investment on the rivals’ profits. Thus a merger, allowing these firms to internalize the externality, increases the incentives to invest leading to higher R&D both inside the merged party and outside, in the industry at large.

In a more recent contribution, Federico et al. (2018) look at how the above considerations interact with the classical unilateral price effects. Mergers obviously reduce price competition and the fact that pre- and post-innovation margins are different has implications for the incentives to innovate above and beyond the ones described above. The idea is that if price competition is more important in the post-innovation phase and if it is strong enough, then higher prices lead to larger returns from investment and therefore boost the incentives to innovate. They show through simulation that which effect prevails depends on the specific assumption made on the nature of competition and therefore it is ultimately an empirical question.

In a closely related paper, Motta and Tarantino (2017) look at the incentives to invest in process innovation of the unit-cost reducing kind following a merger to monopoly. They find that, absent merger-induced efficiency gains, such a merger leads to a decrease in the overall R&D. The intuition goes as follows. The merged entity has a clear unilateral incentive to reduce quantities, which captures the standard market power effect of mergers. But the benefit of lowering marginal costs is greater the larger the quantity produced. Hence, the merged entity has less to gain from innovating and therefore has weaker incentives. They also consider a more challenging scenario where the merger leaves two or more firms active and the case of quality enhancing innovation. The authors consistently argue that absent important R&D spillovers on competitors (i.e. appropriability issues) and efficiency gains, a merger reduces the incentives to innovate.

As said, which effect prevails is ultimately an empirical matter. Ornaghi (2009) investigated the effects of mergers on the long run performance of big pharma firms in the period 1988-2004. He shows that these deals have a negative impact on R&D spending in all years following the merger of about 1 percentage point. This decline is shown not to be matched with an increase in productivity. The number of patents goes down relative to the no merger counterfactual by 30%. The most recent attempt to empirically measure the effect of mergers on innovation is Haucap et al. (2018). They also look at a sample of pharmaceutical mergers, focussing on those reviewed by the European Commission between 1991 and 2007. They use expert market definitions of the European Commission to identify substitute products and thus competitors for each merger case. They document a large decline in innovative activity of the merged entity and among non-merging

competitors. Similarly the paper of Cunningham, Ederer and Ma (2018) discussed at length above supports the same negative conclusion.

A.4. Market power, competition and big data

Many digital firms' core business is that of making *predictions* of various sorts.

Search engines need to predict the relevance of URLs to a consumer query. The higher the relevance of the URLs shown in consumers' search results page, the more likely it is that they will keep using the same search engine for their future queries. Social media and social networks need to predict how interesting a piece of content is to a particular user to build interesting content feeds. The more engaging those feeds are, the more likely it is that consumers will keep engaging with the app in the future. Matchmakers need to find good matches for their users (for instance, employees and employers, single men and single women and so on). They then charge their users for the service of being matched. E-commerce websites need to forecast consumer demand in order to manage their inventories. Other attention platforms such as online portals, newspapers and blogs monetize user attention through ads. They are paid according to user engagement with those ads (say per click). In order to serve more relevant ads, they need to predict the likelihood that a particular user would click on a particular ad. Better targeting translates in more clicks and higher revenues. Content producers and distributors, such as Netflix or Spotify, need to keep their users entertained. In order to do so they need to predict consumer tastes to make recommendations about items already in the catalogue that users are not aware of. They also need predictions to make production choices. Gans and Goldfarb (2018) discuss a variety of Machine Learning and AI algorithms making predictions of various sorts thus enabling new business propositions.

These predictions are made through statistical models (i.e. algorithms) fed by the vast amount of data that online businesses harness on their consumers. These datasets, characterized by a high *volume*, high *velocity*, high *variety* of formats are typically referred to "Big Data". Big data is generated as a by-product of consumption. By naturally engaging with the service, consumers transmit information that is used to improve the predictive power of the algorithms and therefore the quality of service. Web mapping services (such as Waze or Apple maps) pull information on traffic conditions from users roaming the streets while using their apps. Search engines learn about relevance by observing the behaviour of their users on search results page. Content providers (such as Netflix or Spotify) learn about quality by observing user engagement with titles and songs. Second, data is fed back as a production input.

The use of data as an input is widespread since the emergence of the modern industrial firm. One may think about, for instance, the use of survey data about customer satisfaction to improve one's product. However, because big data is a key input when making predictions and predictions are at the core of the value proposition, data-driven businesses are profoundly different from those that simply use data to marginally improve processes and products.

Antitrust authorities and practitioners have voiced concerns that in digital markets data gives incumbents a competitive advantage. The goal of the remainder of this section is to review recent empirical and theoretical papers contributing to this debate.

As discussed in section A.1, data powered economies of scale are a possible foundation of the "positive feedback loop" hypothesis. That is, the "rich get richer" dynamics in which (i) firms with a larger installed base are able to amass more data; (ii) more data allows to improve service; (iii) improved service commands more customers thus more data and so on.

To understand how data might give that advantage, it is useful to first explain how data is actually used for prediction purposes. Typically, prediction algorithms use data for two different goals. First, data is used to *train* these algorithms. That is, to estimate the parameters of the statistical models used to make those predictions. Second, data is used to actually *use* those statistical models. To understand the difference, consider the task of assessing the relevance of a piece of content (say a news article) on a social media website to a particular audience. By crunching data on how different people behaved with that content in the past (did they click on it? Did they like it? Did they engage with it?), the social media website harnesses

information on potential appropriate future audiences for that content. When a new consumer logs in, the website feeds the data on that consumer (for example demographic characteristics) to the algorithm which then uses the estimated parameters to output its best prediction on the likelihood that this consumer will find the content interesting.

Given this, the debate revolves around three key issues:

- data substitutability: to what extent the incumbent's data can be replicated, dispensed of or purchased on the market by an entrant? That is, to what extent the incumbent data is "essential" to make those predictions?
- data complementarity: many contend that combining *diverse* data may give an advantage. For example, Google can improve its search results pages by using the clicks of other users making similar queries. That is, it can learn by leveraging on its scale. Or it could improve / personalize its search results by combining data coming from its email app Gmail or other lines of business;
- data returns to scale: that is, whether and up to which scale increasing the size of a dataset increases prediction accuracy. Decreasing returns would suggest that the advantage of a larger and larger sample vanishes at some scale. And if that scale is small enough, even small entrants can challenge incumbents.

Of course, data held by two sources can be both complement and substitute at the same time. Box A.5 below helps clarify the distinction between data substitutability and complementarity in basic statistical learning theory.

Box A.5: Data substitutability and complementarity in statistical learning theory

Suppose we are trying to predict the value of some variable Y and there are two datasets X and Z containing relevant information. For instance, if Y is a binary variable telling whether a particular user is interested in purchasing a given product then X could contain the activity of the user on social networks and Z could contain her activity on the world wide web, say her browsing history. Clearly adding Z to X or X to Z allows mechanically for better prediction. But how much? Typically, variables in X and Z are correlated. Individuals tweeting about technology are more likely to visit online electronic retailers. This correlation reflects substitutability among data sets. That is, to some extent both data sets contain the same information when it comes to predict if a consumer would be interested in buying a new product for advertising purposes. If firms are paid on the basis of how accurate their predictions are, substitutability alone means that the willingness to pay for data set Z is lower for firms who already have data set X compared to those who don't. Or, in other words, that the value of the bundle $X+Z$ is lower than the sum of the value of having X and the value of having Z alone. Complementarity, instead, reflects the idea that the willingness to pay for Z is higher for firms who already have X . This may occur, for instance, if the covariates interact somehow. Tweeting about a product maybe a better predictor of the intention to buy it if the consumer has looked up this product on an e-commerce website. X and Z can be both complements and substitutes at the same time. Which one prevails depends on whether the willingness to pay for Z is higher or lower for those who already have X relative to those who don't. While complementarity is certainly a theoretical possibility, there is no empirical evidence to warrant the claim that complementarity would swamp substitutability.

Source: Lear

The theoretical arguments and the empirical evidence available in the literature on the above three key aspects is still scarce and not univocal.

Lambrecht and Tucker (2015) argue that big data is not inimitable nor rare. They point to the existence of many alternative data sources and to a flourishing marketplace for data that entrants can access to in order to power their statistical models. There are plenty of examples of large data brokers (such as Acxiom) offering

databases which allow, for example, entrants wishing to compete for advertising money to profile users. Also, they point out that often it is the statistical model used (i.e. the algorithm) rather than the size of the data set what enhances prediction accuracy.

Bajari et al. (2018) provide systematic evidence on the scale issue using proprietary data. They look at the effect of “more data” on accuracy in the context of Amazon retail forecasting system. This is a critical task. If demand turns out to be higher than forecasts, Amazon runs out of stock hence leaving money on the table. On the contrary if demand turns out to be lower than expected, precious warehouse space is wasted, and there might be a need to markdown these products to free some of that space. The specific goal is to predict the weekly sales of each product belonging to 36 different product lines (books, apparel, electronics and so on). They feed their statistical models with data playing with two dimensions: the number of products N in the same category and the number of periods T for which a particular product has been up for sale. They find that the prediction accuracy of their models increases with the time dimension, though with diminishing returns to scale. That is, additional data on previous forecasts and the subsequent realization of retail quantities improves the accuracy of retail forecasts for a particular product. They also find that expanding by adding data on other products in the same category has no effect. Thus, they do not find evidence supporting the “feedback loop” hypothesis wherein big retailers, by selling many products, have a competitive advantage. What matters most is the time dimension (for how long one has been selling a particular product) and the learning curves become quickly flat. Schaefer et al. (2018) provide a similar exercise in spirit in a radically different context. They use observational data from Yahoo.com to assess whether there are economies of scale in internet search. They ask questions such as: how much data is needed for optimal quality? And what type of data? They show that more data enhances predictions as predicted by statistical learning theory and in line with the evidence by Bajari et al. (2018). In addition, they show that personal information (for instance, the ability of the search engine to track the browsing behaviour of specific users) amplifies the speed of learning. Their findings are consistent with an incumbent data advantage due to possession of personal information. Chiou and Tucker (2017) rely on a natural experiment to study whether the amount of historical data affected the accuracy of search results. They surprisingly find little evidence that historical data improves accuracy. Neumann et al. (2018) look at the performance of Data brokers in targeting specific demographics given some data on user behaviour (for instance cookies with their browsing history). Interestingly, they document that brokers that receive bigger datasets do not perform necessarily better.

To date, there is no paper yet tackling explicitly the issue of data complementarities. Thus, claims that diversity enhances accuracy are not based on rigorous systematic evidence.

The rest of this section surveys a recent literature that takes as a given the fact that data gives incumbents a competitive advantage and looks at consequences. To fix ideas, it is useful to think of data as being some essential input that entrants simply lack (the remainder follows closely the analysis of Biglaiser, Calvano and Cremer (2019)).

Clearly, a first, natural question in this context would be: why wouldn't an incumbent which holds such a valuable input be willing to either sell it, share it or license it to other downstream firms? If data is the competitive bottleneck, the argument goes, then the data holder should in principle be able to appropriate all the rents associated. This issue has been extensively studied in the literature on vertical restraints (Hart, Tirole, Carlton, & Williamson, 1990; Rey & Tirole, 2007), in the literature on patent licensing (for instance Gallani, 2002) and in the literature on premium content distribution in media markets (Armstrong, 1999). A very robust “Chicago style” insight coming out of these works is that frictionless markets typically allocate assets in a way that maximizes total surplus. Thus, if data licensing creates value, we should always expect firms to do so, bargaining over their respective share of the surpluses. The literature has thus been looking for reasons for why the market may fail to efficiently allocate data linked to its peculiar nature. For instance, trade could be hindered due to legal barriers such as privacy protection laws. Rubinfeld and Gal (2017) provide a thorough discussion of these peculiarities.

Prufer and Schottmüller (2017) show under which conditions a data advantage leads to market tipping studying a dynamic model of R&D competition. In their model the data advantage of the incumbent is

modelled as follows: in every period, firms can increase the quality of their product at some cost which is decreasing in market share. The resulting quality advantage makes it impossible for entrants to compete. Furthermore, they show that disadvantaged entrants have an incentive to disengage leading to an overall inefficiently low rate of innovation. Finally, they show that if data collected in the primary market is also useful in lowering marginal costs in other, connected markets then incumbents will have a tendency to expand creating big conglomerates much as we observe in many digital markets.

DeCorniere and Taylor (2019) study data-driven mergers in a context where data owned by the upstream firm is useful for price discrimination purposes in the market downstream. They show that a merger affects both competition in the downstream market and the incentives of upstream firms to collect data. In particular, they show that data trading is often better than vertical mergers, as the merged entity has weaker incentives to collect data. Of course, this can be good or bad for economic efficiency depending on the application. In their model data is collected by the upstream firm by providing low priced services in other markets. Then weaker incentives translate in higher prices and thus lower consumer surplus in those market.

Reimers and Shiller (2018) and Cosconati and Santoro (2019) look at the role of data collected by telematic devices (black boxes) installed on cars in the market for automobile liability insurance. Data on past drivers' behaviour mitigates the effects of adverse selection, as it "reveals" consumer types, and moral hazard, as it "monitors" driving. Their paper quantifies empirically the magnitudes of these effects and the benefits that data portability measures would bring. Interestingly, Reimers and Shiller (2018) show that almost all of the gains are in the moral hazard dimension, providing little supporting evidence for the barrier to entry hypothesis. That is, providing little evidence on the hypothesis that the evidence that insurance companies gather on their drivers' abilities through these devices is a barrier to entry in this market.

B. List of past transactions

Table B.1: List of acquisitions made by Amazon

Name of target	Cluster	Sub-cluster
2lemetry	Tools for developers	
AbeBooks	Physical goods and services	Retail
Amie Street	Digital content	Video/Music
Annapurna Labs	Remote storage and file transfer	
AppThwack	Physical goods and services	Robotics
Audible.com	Digital content	E-books/News
Avalon Books	Physical goods and services	Other
Biba Systems	Communication apps and tools	Email and office communication
Blink Home	Physical goods and services	Electronic devices and components
Body Labs	Artificial intelligence, data science and analytics	Artificial Intelligence
Box Office Mojo	Other	
BuyVIP	Physical goods and services	Retail
Cloud9 IDE	Tools for developers	
ClusterK	Remote storage and file transfer	
comiXology	Digital content	E-books/News
Curse, Inc.	Digital content	Games
Do.com	Communication apps and tools	Email and office communication
Double Helix Games	Digital content	Games
Elemental Technologies	Remote storage and file transfer	
Emvantage Payments Pvt. Ltd.	Other	
Evi	Artificial intelligence, data science and analytics	Artificial Intelligence
Fabric.com	Physical goods and services	Retail
GameSparks	Tools for developers	
Goo Technologies	Other	
Goodreads	Communication apps and tools	Topic specific platform
Graphiq	Artificial intelligence, data science and analytics	Data science and analytics
Harvest.ai	Artificial intelligence, data science and analytics	Artificial Intelligence
IVONA Software	Artificial intelligence, data science and analytics	Artificial Intelligence
Kiva Systems	Physical goods and services	Robotics
Lexcycle	Digital content	E-books/News
Liquavista	Physical goods and services	Electronic devices and components
LoveFilm	Physical goods and services	Retail
More	Physical goods and services	Retail
NICE	Remote storage and file transfer	
OpenSCG	Remote storage and file transfer	
PillPack	Home, wellbeing and other personal needs	
Pushbutton	Digital content	Video/Music
Quidsi	Physical goods and services	Retail
Reflexive Entertainment	Digital content	Games
Ring	Physical goods and services	Electronic devices and components
Safaba Translation Systems	Artificial intelligence, data science and analytics	Artificial Intelligence
Shelfari	Communication apps and tools	Topic specific platform
Shoefitr	Home, wellbeing and other personal needs	
SnapTell	Artificial intelligence, data science and analytics	Artificial Intelligence
Souq.com	Physical goods and services	Retail
Sqrrl	Artificial intelligence, data science and analytics	Data science and analytics

Stanza	Digital content	E-books/News
Tapzo	Home, wellbeing and other personal needs	
Teachstreet	Home, wellbeing and other personal needs	
TenMarks Education, Inc.	Home, wellbeing and other personal needs	
The Book Depository	Physical goods and services	Retail
Thinkbox Software	Tools for developers	
Toby Press	Physical goods and services	Other
Touchco	Other	
Twitch	Communication apps and tools	Topic specific platform
Whole Foods Market	Physical goods and services	Retail
Wing.ae	Physical goods and services	Retail
Woot	Physical goods and services	Retail
Yap	Artificial intelligence, data science and analytics	Artificial Intelligence
Zappos	Physical goods and services	Retail

Source: Lear based on Crunchbase data

Table B.2: List of acquisitions made by Facebook

Name of target	Cluster	Sub-cluster
Acrylic Software	Other	
Ascenta	Physical goods and services	Robotics
Atlas solutions	Advertising tools and platforms	
BELUGA	Communication apps and tools	Direct messaging and calls
Bloomsbury AI	Artificial intelligence, data science and analytics	Artificial Intelligence
Branch	Communication apps and tools	Direct messaging and calls
Caffeinatedmind	Remote storage and file transfer	
Chai Labs	Artificial intelligence, data science and analytics	Artificial Intelligence
Confirm	Artificial intelligence, data science and analytics	Artificial Intelligence
ConnectU	Other	
CrowdTangle	Artificial intelligence, data science and analytics	Data science and analytics
DayTum	Home, wellbeing and other personal needs	
Divvyshot	Communication apps and tools	Photo apps
Drop.io	Remote storage and file transfer	
Face.com	Artificial intelligence, data science and analytics	Artificial Intelligence
Faciometrics	Artificial intelligence, data science and analytics	Artificial Intelligence
Fayteq	Other	
FB.com domain name	Other	
Friend.ly	Communication apps and tools	Other
FriendFeed	Communication apps and tools	Aggregators
Friendster	Communication apps and tools	Topic specific platform
Glancee	Communication apps and tools	Other
Gowalla	Communication apps and tools	Topic specific platform
Hot Potato	Communication apps and tools	Topic specific platform
Hot Studio	Tools for developers	
Infiniled	Physical goods and services	Electronic devices and components
Instagram	Communication apps and tools	Photo apps
Jibbig	Artificial intelligence, data science and analytics	Artificial Intelligence
Karma	Home, wellbeing and other personal needs	
Lightbox.com	Communication apps and tools	Photo apps

Little Eye Labs	Tools for developers	
Liverail	Advertising tools and platforms	
MailRank	Communication apps and tools	Email and office communication
Masquerade	Communication apps and tools	Other
Monoidics	Artificial intelligence, data science and analytics	Artificial Intelligence
Nascent Objects	Physical goods and services	Electronic devices and components
Nextstop	Communication apps and tools	Topic specific platform
Octazen	Communication apps and tools	Other
Oculus VR	Physical goods and services	Other
Onavo	Artificial intelligence, data science and analytics	Data science and analytics
Osmeta	Other	
Ozlo	Artificial intelligence, data science and analytics	Artificial Intelligence
Parse	Tools for developers	
Pebbles	Tools for developers	
PrivateCore	Remote storage and file transfer	
ProtoGeo Oy	Home, wellbeing and other personal needs	
Pryte	Home, wellbeing and other personal needs	
Push Pop Press	Digital content	E-books/News
Quickfire	Remote storage and file transfer	
RecRec	Tools for developers	
Redkix	Communication apps and tools	Email and office communication
Refdash	Other	
Rel8tion	Advertising tools and platforms	
ShareGrove	Communication apps and tools	Direct messaging and calls
snaptu	Tools for developers	
Sofa	Tools for developers	
Spaceport	Tools for developers	
Spool	Home, wellbeing and other personal needs	
SportStream	Artificial intelligence, data science and analytics	Data science and analytics
Strobe	Tools for developers	
Surreal Vision	Physical goods and services	Robotics
Tagtile	Advertising tools and platforms	
tbh(app)	Communication apps and tools	Other
TheFind	Physical goods and services	Retail
Threadsy	Communication apps and tools	Aggregators
Two Big Ears	Physical goods and services	Electronic devices and components
Vidpresso	Communication apps and tools	Other
WaveGroup Sound	Digital content	Video/Music
WhatsApp	Communication apps and tools	Direct messaging and calls
Wit.ai	Tools for developers	
Zurich eye	Tools for developers	

Source: Lear based on Crunchbase data

Table B.3: List of acquisitions made by Google

Name of target	Cluster	Sub-cluster
60db	Digital content	E-books/News
Aardvark	Communication apps and tools	Other
Admeld	Advertising tools and platforms	
AdMob	Advertising tools and platforms	
Adometry	Advertising tools and platforms	
Agawi	Digital content	Video/Music
Agnilux	Physical goods and services	Electronic devices and components
AIMatter	Artificial intelligence, data science and analytics	Artificial Intelligence

Alpental Technologies	Physical goods and services	Electronic devices and components
Angstro	Communication apps and tools	Aggregators
Anvato	Tools for developers	
API.AI	Artificial intelligence, data science and analytics	Artificial Intelligence
Apigee	Tools for developers	
AppBridge	Remote storage and file transfer	
Appetas	Other	
AppJet	Tools for developers	
Appurify	Tools for developers	
Apture	Home, wellbeing and other personal needs	
Autofuss	Advertising tools and platforms	
BandPage	Communication apps and tools	Topic specific platform
BeatThatQuote.com	Physical goods and services	Retail
bebop	Remote storage and file transfer	
Behavio	Artificial intelligence, data science and analytics	Artificial Intelligence
Bitium	Remote storage and file transfer	
Bitspin	Home, wellbeing and other personal needs	
BlindType	Home, wellbeing and other personal needs	
Bot & Dolly	Physical goods and services	Robotics
BufferBox	Physical goods and services	Retail
Bump	Tools for developers	
BumpTop	Home, wellbeing and other personal needs	
Cask	Tools for developers	
Channel Intelligence	Physical goods and services	Retail
Clever Sense	Home, wellbeing and other personal needs	
Cronologics	Physical goods and services	Electronic devices and components
DailyDeal	Physical goods and services	Retail
Dark Blue Labs & Vision Factory	Artificial intelligence, data science and analytics	Artificial Intelligence
Dealmap	Physical goods and services	Retail
DeepMind Technologies	Artificial intelligence, data science and analytics	Data science and analytics
Digisfera	Other	
Director	Advertising tools and platforms	
Divide	Home, wellbeing and other personal needs	
DNNresearch Inc.	Artificial intelligence, data science and analytics	Artificial Intelligence
DocVerse	Other	
drawElements	Tools for developers	
Dropcam	Physical goods and services	Electronic devices and components
eBook Technologies	Other	
Emu	Communication apps and tools	Email and office communication
Episodic	Digital content	Video/Music
Eyefluence	Physical goods and services	Other
Fabric	Tools for developers	
FameBit	Advertising tools and platforms	
Firebase	Tools for developers	
FlexyCore	Tools for developers	
Flutter	Artificial intelligence, data science and analytics	Artificial Intelligence
Fly Labs	Other	
Fridge	Communication apps and tools	Direct messaging and calls
Gecko Design	Other	
Gizmo5	Communication apps and tools	Direct messaging and calls

Global IP Solutions	Communication apps and tools	Direct messaging and calls
GraphicsFuzz	Tools for developers	
Green Parrot Pictures	Other	
GreenThrottle	Digital content	Games
Halli Labs	Artificial intelligence, data science and analytics	Artificial Intelligence
Holomni	Physical goods and services	Robotics
HTC (portions)	Physical goods and services	Electronic devices and components
Impermium	Other	
Incentive Targeting Inc.	Advertising tools and platforms	
Industrial Perception	Artificial intelligence, data science and analytics	Artificial Intelligence
Instantiations	Tools for developers	
Invite Media	Advertising tools and platforms	
Jambool	Other	
Jetpac	Communication apps and tools	Photo apps
Jibe Mobile	Communication apps and tools	Direct messaging and calls
Kaggle	Artificial intelligence, data science and analytics	Data science and analytics
Katango	Communication apps and tools	Other
Kifi	Artificial intelligence, data science and analytics	Data science and analytics
LabPixies	Other	
LaunchKit	Tools for developers	
Launchpad Toys	Home, wellbeing and other personal needs	
LeapDroid	Tools for developers	
Lift Labs	Physical goods and services	Electronic devices and components
Like.com	Artificial intelligence, data science and analytics	Artificial Intelligence
Limes Audio	Communication apps and tools	Direct messaging and calls
Makani Power	Physical goods and services	Other
mDialog	Advertising tools and platforms	
Meebo	Communication apps and tools	Direct messaging and calls
Meka Robotics	Physical goods and services	Robotics
Metaweb	Other	
Milk, Inc	Tools for developers	
Moodstocks	Tools for developers	
Motorola Mobility	Physical goods and services	Electronic devices and components
MyEnergy	Home, wellbeing and other personal needs	
Nest Labs	Home, wellbeing and other personal needs	
Next New Networks	Digital content	Video/Music
Nik Software, Inc.	Other	
Odysee	Communication apps and tools	Photo apps
Omnisio	Communication apps and tools	Other
On2	Tools for developers	
Onward	Artificial intelligence, data science and analytics	Artificial Intelligence
Orbitera	Physical goods and services	Retail
Owlchemy Labs	Digital content	Games
Oyster	Digital content	E-books/News
Phonetic Arts	Artificial intelligence, data science and analytics	Artificial Intelligence
Picnik	Communication apps and tools	Photo apps
Pie	Communication apps and tools	Email and office communication
PittPatt	Artificial intelligence, data science and analytics	Artificial Intelligence
Pixate	Tools for developers	
Plannr	Communication apps and tools	Email and office communication

PlinkArt	Artificial intelligence, data science and analytics	
Polar	Communication apps and tools	Other
Pulse.io	Tools for developers	
Punchd	Physical goods and services	Retail
PushLife	Remote storage and file transfer	
Quest Visual	Artificial intelligence, data science and analytics	Artificial Intelligence
Quickoffice	Other	
Quiksee	Other	
Qwiklabs	Tools for developers	
Rangespan	Artificial intelligence, data science and analytics	Data science and analytics
reCAPTCHA	Artificial intelligence, data science and analytics	Artificial Intelligence
Red Hot Labs	Advertising tools and platforms	
Redwood Robotics	Physical goods and services	Robotics
RelativeWave	Tools for developers	
Relay Media	Tools for developers	
reMail	Communication apps and tools	Email and office communication
Revolv	Home, wellbeing and other personal needs	
RightsFlow	Other	
Ruba.com	Home, wellbeing and other personal needs	
SageTV	Digital content	Video/Music
SayNow	Communication apps and tools	Direct messaging and calls
SCHAFT, Inc.	Physical goods and services	Robotics
Senosis	Home, wellbeing and other personal needs	
Simplify Media	Remote storage and file transfer	
Skillman & Hackett	Tools for developers	
Skybox Imaging	Artificial intelligence, data science and analytics	Data science and analytics
SlickLogin	Other	
Slide.com	Communication apps and tools	Other
SocialDeck, Inc.	Advertising tools and platforms	
SocialGrapple	Artificial intelligence, data science and analytics	Data science and analytics
Softcard	Other	
Songza	Digital content	Video/Music
Sparrow	Communication apps and tools	Email and office communication
spider.io	Other	
Stackdriver	Remote storage and file transfer	
Synergyse	Other	
Talaria Technologies	Tools for developers	
Tenor	Communication apps and tools	Other
Teracent	Advertising tools and platforms	
Thrive Audio	Tools for developers	
Timeful	Home, wellbeing and other personal needs	
Titan Aerospace	Physical goods and services	Robotics
TNC	Communication apps and tools	Topic specific platform
TxVia	Other	
Urban Engines	Artificial intelligence, data science and analytics	Data science and analytics
Velostrata	Remote storage and file transfer	
Vidmaker	Other	
Viewdle	Artificial intelligence, data science and analytics	Artificial Intelligence
VirusTotal.com	Other	
Wavii	Digital content	E-books/News

Waze	Home, wellbeing and other personal needs	
Webpass	Physical goods and services	Other
Widevine Technologies	Other	
Wildfire Interactive	Advertising tools and platforms	
WIMM Labs	Physical goods and services	Electronic devices and components
Zagat	Home, wellbeing and other personal needs	
Zave Networks	Physical goods and services	Retail
Zetawire	Other	
Zynamics	Other	
Zync Render	Other	

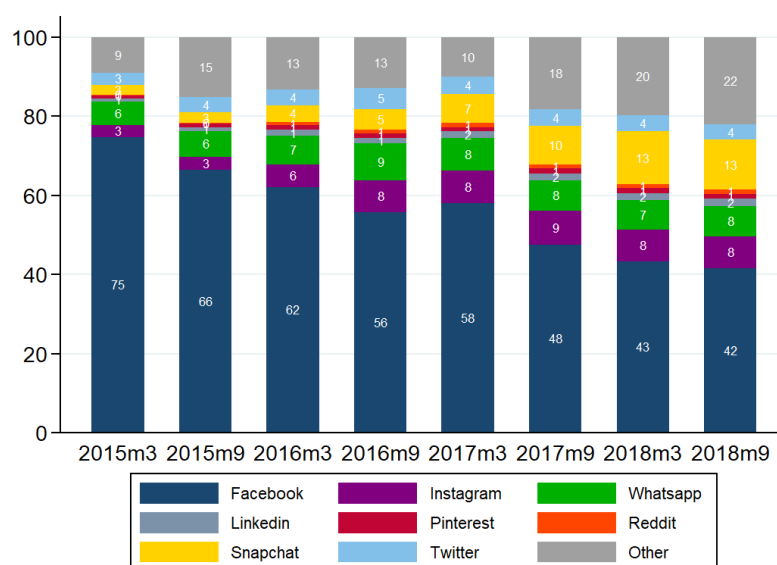
Source: Lear based on Crunchbase data

D. Case by case review: additional analyses and robustness checks

D.1. Facebook/Instagram

Figure D.1 shows the share of time spent by users on Facebook and Instagram, considering a broader market including all the social media platforms²¹⁵. As observed for the market for social networks, the share of time spent on Facebook has declined over time, from 75% in 2015 to 42% in 2018. Instagram's share has instead increased until 2016, and it has remained stable at the level of 8% thereafter. WhatsApp, which is also owned by Facebook, shows the same share of time spent as Instagram.

Figure D.1: Share of monthly time spent on social media in the UK (%)

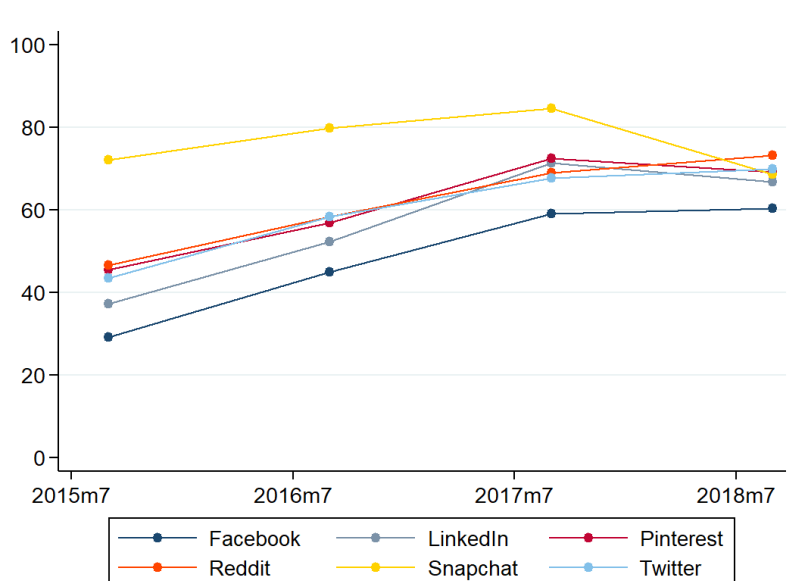


Source: Lear based on ComScore data

Figure D.2 shows the percentage of other social networks users that visits Instagram in the UK. Such percentage has increased between 2015 and 2018, reaching the level of 60% for Facebook users, 67% for LinkedIn users, 69% for Pinterest users, 73% for Reddit users and 70% for Twitter users. With respect to Snapchat, the percentage of its users that were visiting Instagram has instead decreased between 2017 and 2018. By selling advertising space on Instagram, advertisers get to reach, on average, almost 70% of the main social networks users.

²¹⁵ ComScore defines "Social media" all the sites where the creation and consumption of content is user generated.

Figure D.2: Percentage of other platforms' users that visits Instagram in the UK



Source: Lear based on ComScore data

D.2. Priceline/Kayak and Expedia/Trivago

The analysis shown in section II.4.2.3 on the existence of a possible intermediation bias has been conducted using data on search results for a number of queries for hotel accommodations extracted from Kayak.co.uk and Trivago.co.uk websites.²¹⁶

The information collected from Kayak pertained to the search results obtained for a list of 49 cities, which were identified based on their popularities on Kayak's websites. Data refers to booking queries for one room and two guests, for the period March 1-March 3, 2019. The queries have been made on February 14, 2019. For each query made for a different city, data is related to the first 15 hotels appearing in search results on Kayak website. Hotels were sorted based on the "recommended" order.

To ensure comparability, the information collected from Trivago referred to the same list of cities used for Kayak²¹⁷ and for the same type of query (one room and two guests). The queries have been made on March 14 for the period March 22-March 24, 2019 and, for each destination, data is related to the first 15 hotels appearing in search results, sorted by Trivago's recommended order.

For each hotel listed on Kayak and Trivago results page, the data provided is as follows:

- the name of the hotel and its position in the results page;
- booking options available, including:
 - the name;
 - the price (£);
 - whether the booking option is through an OTA or the TSP;
 - whether they are shown above the "View Deal" button;
 - whether they are shown on the search results page;
 - whether they can be reached by clicking on the "More sites" button.

²¹⁶ In particular, Kayak's data has been extracted with the help of Kayak.

²¹⁷ Results for one city, Fair Play (California), were not available on Trivago.

Table D.1 shows an example of the results obtained for the query conducted for the city of Blackpool, England, on Kayak’s website.

Table D.1: Example of Kayak’s results for the city of Blackpool

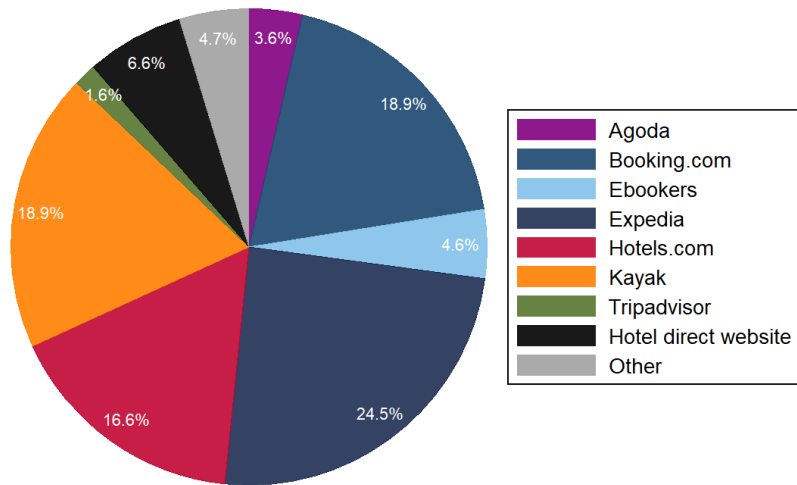
Hotel name	Ranking	Booking option	Price (£)	OTA/TSP	Display position
Ellan Vannin	1	KAYAK	56.26	OTA	View Deal
Ellan Vannin	1	expedia.com	58	OTA	Search results page
Ellan Vannin	1	booking.com	58.02	OTA	Search results page
Ellan Vannin	1	ebookers.com	56.26	OTA	More sites
Ellan Vannin	1	hotels.com	56.26	OTA	More sites
Ellan Vannin	1	travelrepublic.com	58.64	OTA	More sites
...
Windsor Park	15	KAYAK	92.79	OTA	View Deal
Windsor Park	15	laterooms.com	92.79	OTA	Search results page
Windsor Park	15	expedia.com	92.79	OTA	Search results page
Windsor Park	15	booking.com	92.83	OTA	More sites
Windsor Park	15	ebookers.com	92.79	OTA	More sites
Windsor Park	15	agoda.com	92.79	OTA	More sites
Windsor Park	15	hotels.com	92.79	OTA	More sites
Windsor Park	15	travelrepublic.com	92.79	OTA	More sites

Source: Kayak

Below we present further figures that may help to investigate whether Kayak and Trivago may have biased their results to favour Priceline’s and Expedia’s brands respectively. We repeat the analysis conducted in section II.4.2.3 considering both the “View Deal” and the search results page position as the most favourable position. Moreover, we considered whether the potential bias is more or less clear when limiting the analysis to the top three hotels in the search results page, which are the most prominent among all those listed on the website.

Figure D.3 shows the share of each booking option considering both the “View Deal” position and the search results page of Kayak’s website. As happened when considering only the “View Deal” position, Kayak, Hotels.com, Expedia and Booking.com are the booking options that appear more frequently in these favourable positions.

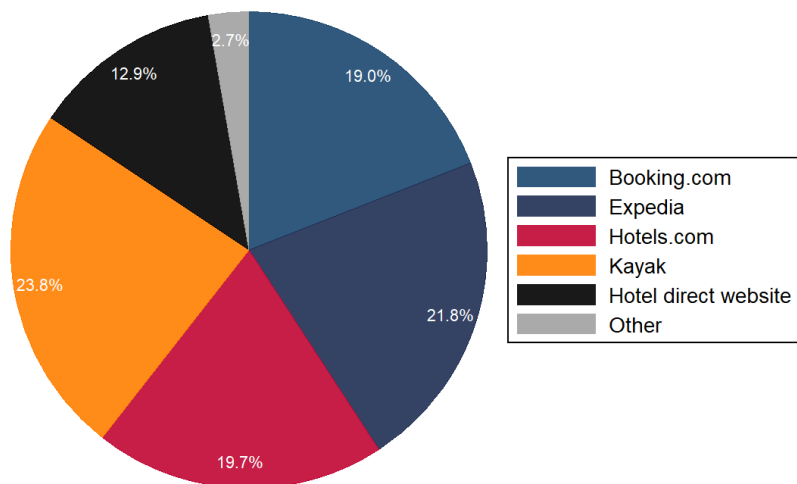
Figure D.3: Share of booking options in “View Deal” position and search results page for Kayak results²¹⁸



Source: Lear based on Kayak data

Figure D.4 shows the share of booking options appearing in the “View Deal” position for the top three accommodations ranked in the results page of Kayak’s website. The most frequent booking option is Kayak (23.6%), followed by Expedia (21.8%), Booking.com (19%) and Hotels.com (19.7%).

Figure D.4: Share of booking options in “View Deal” position for top three hotels for Kayak results²¹⁹



Source: Lear based on Kayak data

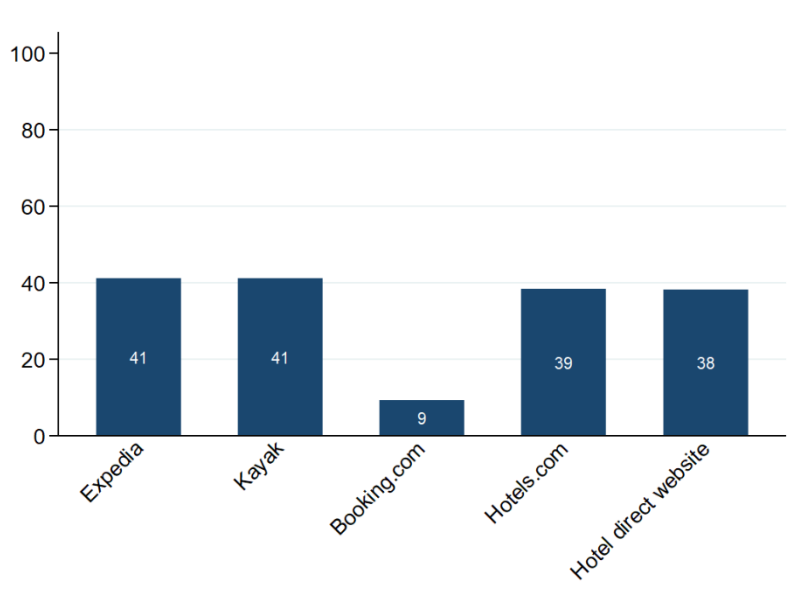
Figure D.5 shows the frequency at which OTAs and TSPs charges the lowest price when listed in both “View Deal” and search results page in Kayak’s website. Considering together these positions, Booking.com appears to offer the cheapest price only in 9% of cases, while Expedia, Kayak, Hotels.com and the TSPs have the lowest

²¹⁸ The category “Other” includes 17 booking options.

²¹⁹ The category “Other” includes Amoma and Homeaway.

offer in around 40% of cases. As happened when considering the Vied Deal position alone, Booking.com is still the OTAs that charge the lowest price with less frequency when considering both the “View Deal” and the search results page.

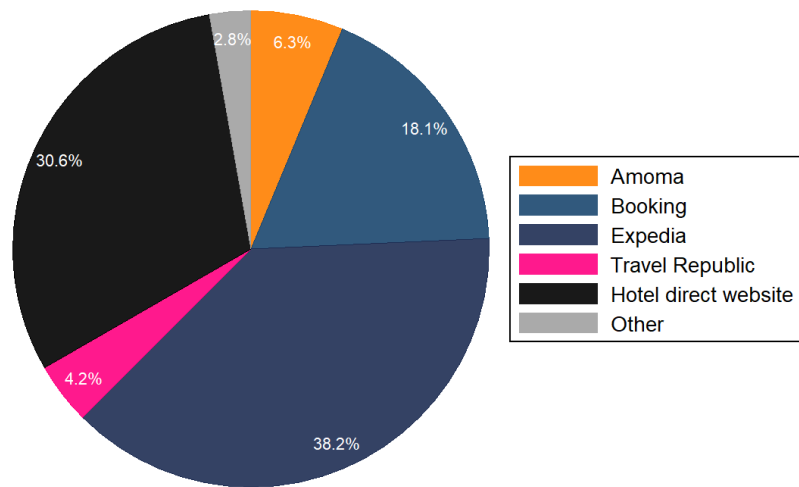
Figure D.5: Frequency at which OTAs/TSPs charge the lowest price when listed in “View Deal” and in search results page for Kayak results (%)



Source: Lear based on Kayak data

Figure D.6 shows the share of booking options appearing in the “View Deal” position for the top three accommodations ranked in the results page on Trivago’s website. As observed when considering all the hotels ranked in the first 15 positions, the “View Deal” position for the hotels ranked in the top three positions is largely occupied by Expedia (38.2% of cases), followed by the TSP (30.6% of cases) and Booking.com (18.1% of cases).

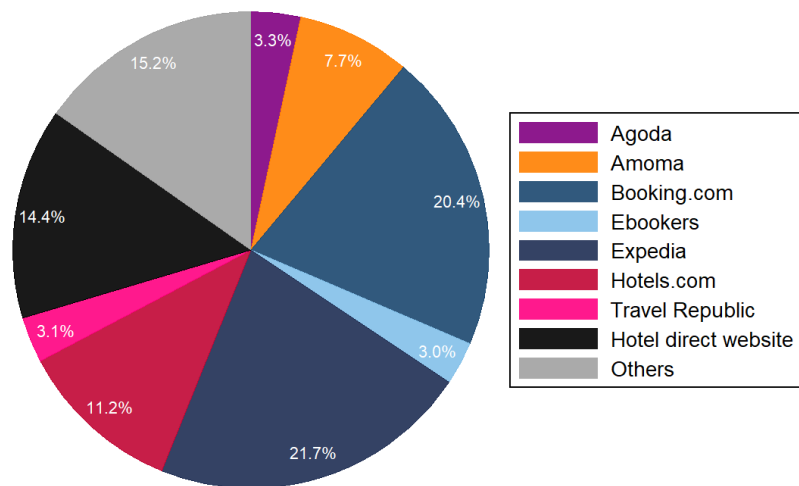
Figure D.6: Share of booking options in “View Deal” position for top three hotels for Trivago results²²⁰



Source: Lear based on Trivago data

Figure D.7 shows, for Trivago’s website, the share of each booking option considering both the “View Deal” position and the search results page. The result obtained is significantly different from the one shown in Figure II.24: in the “View Deal” position alone, Expedia is shown in 40.4% of case, while this values drops to 21.7% when the “View Deal” position is considered together with the search results page.

Figure D.7: Share of booking options in “View Deal” position and in search results page for Trivago results²²¹



Source: Lear based on Trivago data

²²⁰ The category “Other” includes Alpharooms, Hotels.com, Loveholidays, Japanican.

²²¹ The category “Other” includes 26 booking options.

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