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Economist's Note

When Do Markets Tip? An Overview and Some Insights for Policy[†]

Özlem Bedre-Defolie* and Rainer Nitsche**

I. Introduction

Competition authorities are increasingly concerned that their tools are not fit to deal with markets with digital multi-sided platforms (MSPs). These markets have a tendency to 'tip' in the sense that one MSP takes it all or dominates the market by far.

The need for a new competition tool has been expressed by the European Commission's Executive Vice-President, Margrethe Vestager, in charge of competition policy:

'Our rules have an inbuilt flexibility which allows us to deal with a broad range of anti-competitive conduct across markets. We see, however, that there are certain structural risks for competition, such as tipping markets, which are not addressed by the current rules' (European Commission Press Release, 2 June 2020).¹

Similar discussions take place in the EU member states, where recent policy reports and law amendment proposals recommend new tools,² and also in other jurisdictions.³ Besides the vigorous enforcement of

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¹ European Commission Press Release, 2 June 2020. https://ec.europa.eu/competition/presscorner/detail/en/ip_20_977, accessed 23 August 2020.

² Consider, for example, H Schweitzer, J Haucap, W Kerber, and R Welker, 'Modernisierung der Missbrauchsaufsicht für marktmächtige Unternehmen', Baden-Baden 2018; M Schallbruch, H Schweitzer, A Wambach, W Kirchhoff, B Langeheine, ... , and G Wagner, 'Ein neuer Wettbewerbsrahmen für die Digitalwirtschaft Bericht der Kommission Wettbewerbsrecht, 4, (2019); and Draft GWB-Digitilisation Act 2020 for Germany.

³ To this effect, see, J Furman, D Coyle, A Fletcher, D McAuley, and P Marsden, 'Unlocking digital competition: Report of the digital competition expert panel' (2019) UK government publication, HM Treasury. See also, F Scott Morton, *Stigler Committee on Digital Platforms* (Stigler Center for the Study of the Economy and the State, Chicago Booth 2019).

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Key Points

- Current policy proposals intend to prevent market tipping.
- As multi-sided platform (MSP) markets are dynamic and unpredictable, it is challenging to identify which markets tip and the characteristics of tipping candidates *ex ante* (before tipping).
- Based on a review of factors that foster and mitigate tipping, we propose four key questions that may help in ranking MSP markets by the likelihood of tipping.

existing competition rules, instruments discussed include: (i) the lowering of intervention thresholds to pursue firms that are not (yet) dominant but may have 'relative market power' or a 'gatekeeper role', (ii) the possibility of *ex ante* regulation of digital markets, and (iii) a 'new competition tool' to 'deal with structural competition problems across markets which cannot be tackled or addressed in the most effective manner on the basis of the current competition rules (e.g. preventing markets from tipping)' (European Commission Press Release, 2 June 2020).⁴

While there appears to be a universal concern related to the (market) power of a number of very dominant MSPs, the academic literature does not yet provide a simple guide for an integrated 'tool' to identify the likelihood of tipping in a market and to assess its welfare consequences. However, the literature illustrates a number of factors that might foster or mitigate tipping under certain circumstances.

At least in Europe, general search markets have tipped for Google, and many social media markets have tipped for Facebook. Several regional platform markets, however, did not tip. Examples include real estate, music and video-on-demand streaming, recruitment, video games, delivery services, ridesharing, app stores, dating, communication, and vertical search engines (i.e. search engines

⁴ European Commission Press Release, 2 June 2020. https://ec.europa.eu/competition/presscorner/detail/en/ip_20_977, accessed 23 August 2020.

that address users' queries related to a particular subject matter, like hotels or flights). This raises some interesting questions: Why don't we have tipping in these markets? Might they tip? Should competition authorities and regulators follow a particular strategy to prevent tipping in markets at risk of tipping?

To address these questions, we review the literature, many current and past examples, and identify the key market characteristics that facilitate tipping and those that mitigate it. These include both exogenous and endogenous characteristics resulting from platforms' optimal strategies. We, at the end, propose four key questions to guide policy makers in the development of methods identifying the likelihood of tipping and interventions to prevent tipping. We highlight potential short-term welfare gains from tipping and long-term costs of tipping. We encourage more research to develop tools to measure these and help the policy makers to predict the net welfare impact of tipping in addition to the likelihood of tipping.

II. Factors facilitating tipping in markets with MSPs

We identify six key factors that foster tipping in markets with MSPs: positive network effects, single-homing and switching costs, free services, data-enabled learning, trust, and platforms' complementary offerings. Markets with MSPs also exhibit classical factors that foster concentration, like a long purse or economies of scale due to high fixed costs for IT, R&D, and marketing, which are largely independent of the number of users.⁵

The economic literature on platform markets identifies factors that create a 'tipping dynamic', like positive network effects, data enabled-learning, and factors that lead to an 'incumbency advantage' by creating barriers to entry, like switching costs. We include both as factors fostering tipping since if a leading firm is sheltered from competitive threats due to barriers to entry, it is more likely that the market tips for the incumbent than in the case where entry is easier. In addition, the more likely an established firm will be challenged, the less the harm due to its strong market position.

⁵ These are well explored in competition policy, so we do not focus on them here. However, they are important for the understanding of the market dynamics that lead to tipping since large MSPs benefiting from economies of scale and a long purse might have incentives to eliminate small rivals via a predatory strategy.

A. Positive network effects

When one additional user increases the value generated by other users of the same platform, this positive externality between users is called a 'positive network effect'. Positive network effects could be within one group of users, for example, more users sharing content on a social media platform makes it more valuable for other users. This is a standard network effect in the sense that one more user improves the utility of the other users. More searchers improve a search engine's algorithm and so make it more valuable for other searchers. This is 'data-enabled learning', leading to a positive feedback loop between users, which in turn creates within-group network effects when different users' data enable the platform to improve its search results (see Section II.D). Positive network effects could be across different groups of users, for example, more sellers attracting more buyers, and vice versa, on an e-commerce platform, like eBay or Amazon.

Positive network effects (within- and cross-group) lead to a positive feedback loop between users, which facilitates tipping. Facebook's initial growth relied on within-group positive network effects. Google's initial growth relied on data-enabled learning generating positive feedback loops similar to within-group network effects. Google became an MSP by offering an advertising platform (formerly Google AdWords, now Google Ads) that connects third-party websites to Google advertising. Similarly, Facebook became an MSP by adding app developers, advertisers, and third-party websites to its initial product (social network). While the addition of advertisement may not always be favoured by users, it creates an additional incentive for platforms to expand the user base to increase profits. Thus, the multi-sidedness and the positive network effects between these sides foster tipping, like in the Facebook and Google examples.

I. Tipping dynamics and barriers to entry due to positive network effects

Starting a business in a market with positive network effects is challenging due to the difficulty of attracting users from an established incumbent, as users usually fail to coordinate their choices of which firm to patronise.⁶ Launching an MSP where the essential network effects are cross-group is even more challenging as a new player needs to attract simultaneously different user

⁶ See, J Farrell and G Saloner, 'Standardization, Compatibility and Innovation' (1985) 16:1 p. 70–83 *The RAND Journal of Economics*; see also, M Katz and C Shapiro, 'Network Externalities, Competition, and Compatibility' (1985) 75:3 p. 424–440 *American Economic Review*; and P Klemperer, 'Markets with consumer switching costs' (1987) 102:2 p. 375–394 *The Quarterly Journal of Economics*.

groups, which usually cannot coordinate their platform choice. This results in the well-known coordination or chicken-and-egg problem at the launch of a new platform.⁷

Coordination failure among users can arise due to their 'favourable expectations for the incumbent', that is, they will expect others to choose the platform that is currently leading.⁸ This will give an established incumbent a competitive advantage even if the competitor is better in dimensions different from the user base (e.g. if it has a better matching function). Halaburda *et al.* (2020) emphasise that this will be the case even in a repeated interaction (dynamic competition) framework, where a better entrant would be more willing to stay in the market anticipating higher returns from future dominance. Users' coordination failure to switch to a better entrant might also arise due to a 'let others test the waters' or 'free-rider' effect when users do not want to be the first to migrate to the new entrant.⁹

Thus, positive network effects raise barriers to entry for platforms and might enable incumbents to protect their market even if the new platform offers better quality products and services.¹⁰

2. Assessing positive network effects

To assess the strength of network effects at work, we suggest beginning with the identification of the type of network effects that are essential for the platform's core value. For social media platforms and search platforms, as we discuss above, within-group positive network effects are essential. For matchmaking platforms (like Airbnb, Uber, dating platforms, job search platforms, or real estate platforms), cross-group network effects are essential since the value of a matchmaker requires attracting both sides at the same time.

We next suggest identifying whether it is the membership/adoption of a platform that creates the core value or the activity/transaction of the users on the platform. For an entrant or a small matchmaking platform, the network externality due to membership/adoption would generate

the core value, whereas for a well-established social media platform, the activity of registered users, like updating their profiles, sharing content, or reacting to others' content, will constitute the core value. The strength of network effects is larger in general if participants are also actively using services, as this leads to more value (e.g. through user-generated content).

Finally, the number of users might not be the right measure of network effects when users on one side have tastes for a variety of services or products on the other side of the market (e.g. a listing platform like Craigslist or Airbnb). In order to challenge a dominant player in such markets, a rival would need to attract a wide variety of types of sellers or listings to make its platform at least as attractive as the dominant platform for buyers. This might make the entry or survival of a small rival more difficult compared to a situation where platforms offer homogenous products and services, like ridesharing from A to B, where simply increasing the number of users on both sides would be sufficient to get the network effects to work. A necessity to attract a long tail of users and suppliers is generally conducive to tipping since it generates barriers to entry by slowing down the launch of a new platform and hence shelters the established platform from competition.

While the number of users (membership/adoption) can often be easily measured, the level of activity or the tastes for variety will at times be more complex to capture, depending on the details of a case.

B. Single-homing and (endogenous) switching costs

How network effects affect the competition between platforms depends on whether users single-home (i.e. adopt only one platform) or whether they multi-home (i.e. adopt several platforms). In this section, we discuss the effects of single-homing and platforms' actions to increase switching costs endogenously. In Section III.C, we pick up multi-homing as a factor mitigating tipping and discuss when users multi-home on one side and how this affects the other sides' users' behaviour.

Single-homing in general facilitates tipping since users then opt for one platform or another, which makes the survival of a smaller MSP less likely.¹¹ Moreover, optimal pricing then involves price discrimination between two sides, called 'divide and conquer': The larger MSPs can win the market by subsidising participation on one side and by compensating the loss (making money) on the

7 B Caillaud and B Jullien, 'Chicken & Egg: Competition among Intermediation Service Providers' (2003) 34:2 p. 309–328 *The RAND Journal of Economics*.

8 *Ibid.* 7; see also, H Halaburda and Y Yehezkel, 'The role of coordination bias in platform competition' (2016) 25:2 p. 274–312 *Journal of Economics & Management Strategy*; and H Halaburda, B Jullien and Y Yehezkel, 'Dynamic competition with network externalities' (2020) 51:1 p. 3–31 *The RAND Journal of Economics*.

9 G Biglaiser, J Crémer and A Veiga, 'Should I Stay or Should I Go? Migrating away from an Incumbent Platform' (2020) Working Paper *mimeo*, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3557782 accessed 23 August 2020.

10 G Biglaiser, E Calvano and J Crémer, (2019) 'Incumbency Advantage and its Value' 28:1 p. 41–48 *Journal of Economics & Management Strategy*.

11 See n 7.

other side since the larger MSPs can generate more value for users.

Dominant MSPs might take some actions that raise switching costs to facilitate single-homing and hence tipping. For instance, a platform can prevent multi-homing of users via exclusive contracts. Exclusive dealing arrangements are widely used between the operating systems, app stores, and application developers; pay TV, cable TV, video-on-demand streaming platforms (like Netflix, Hulu), and content providers; video game platforms and game developers; and shopping malls and outlets (under the name of radius restrictions). They have raised concerns in some important antitrust cases since they might lead to tipping, reduce variety for consumers, weaken competition in the market, and lead to foreclosure of more efficient or more valuable platforms.¹² Even when such exclusivity agreements affect only a part of the relevant market, competition authorities have recently intervened.¹³ On the other hand, exclusivity with a popular seller could help an entrant overcome the chicken-and-egg problem at the launch of the platform. Lee (2013)¹⁴ provides evidence that exclusive contracts with popular games indeed benefitted entrant game platforms in the sixth generation of the US video game industry (2000–2005).

Exclusive contracts with sellers can be profitable for symmetric platforms even if they raise competition on the seller side, since on the buyer side, platforms can make more revenues by providing exclusive access to sellers.¹⁵ An exclusive contract between an incumbent and a provider of a high-quality ('marquee') product or premium content might make a smaller rival platform

less attractive for consumers and also less attractive for (non-competing) fringe sellers due to positive cross-group network effects.¹⁶ Even when fringe sellers compete against the marquee seller (negative within-group network effects), such exclusive provisions might prevent an entry or reduce the quality of an existing rival platform.¹⁷ As a result, exclusive dealing between a dominant platform and a popular or marquee seller might lead to the tipping of the market. These theories rely on the assumption that consumers are single-homing and the popular product seller chooses whether to single-home or multi-home. If there are differentiated popular sellers, they may want to single-home on different platforms to avoid competing fiercely on the same platform.¹⁸ This in turn may generate more gains from selling their exclusivity to competing platforms. It is again likely that the established platform attracts the more valuable seller exclusively, leaving the less valuable seller to its small rival.

Exclusive dealing might also arise even if it is not explicitly stated in a contract but is implemented instead indirectly via sophisticated non-linear contracts or loyalty discounts. For instance, Uber's and Lyft's loyalty programmes for riders and drivers¹⁹ and real estate platforms' quantity discounts to agents. Exclusive dealing provisions (explicit or implicit) might facilitate tipping in the market by raising costs of multi-homing for users of dominant platforms.

A platform can also raise switching costs through personalized offers that improve if the platform knows more about the user, which is called 'within-user data enabled learning'.²⁰ Consider, for instance, Pandora or Spotify music services and Google's search bar (toolbar personalization, personalized most relevant search results, etc.).

MSPs are more likely to tip if their users have to invest a lot in order to use them, for example, users on Facebook, Airbnb, and LinkedIn have to spend quite a bit of time setting things up to work and even more so for the seller side in some marketplaces, which rely on sellers building up a reputation via good ratings. MSPs can design their

12 In the USA, Microsoft (253F.3d 34, 2001) and Visa (344F.3d 229, 2003) cases; in the EU, Microsoft case (COMP/C-3/37.792, 2004). The European Commission's (EC) historic fine to Google in July 2018 was due to Google's licencing conditions and exclusivity arrangements with Android device manufacturers and mobile network operators for its search services. The authority argued that Google holds a dominant position in search services and exclusivity clauses imply that rival search services cannot access mobile devices that have exclusivity with Google and that this will 'harm consumers by stifling competition (among search engines) and restricting innovation in wider mobile space' (COMP/40099).

13 Federal Cartel Office, CTS Eventim, Decision 4 December 2017, B6–132/14–2; see also for similar issues with radius clauses of shopping malls P Belleflamme and M Peitz, 'Managing Competition on a Two-Sided Platform' (2019a) 28:1 p. 5–22 *Journal of Economics & Management Strategy* 3; and TG Brühn and G Götz 'Exclusionary Practices in Two-Sided Markets: The Effect of Radius Clauses on Competition between Shopping Centers' (2018) 39:5 p. 577–590 *Managerial and Decision Economics*.

14 RS Lee, 'Vertical Integration and Exclusivity in Platform and Two-sided Markets' (2013) 103:7 p. 2960–3000 *American Economic Review*.

15 See inter alia, M Armstrong and J Wright, 'Two-Sided Markets, Competitive Bottlenecks and Exclusive Contracts' (2007) 32:2 p. 353–380 *Economic Theory*; P Belleflamme and M Peitz, 'Platform Competition: Who Benefits from Multi-Homing?' (2019b) 64 p. 1–26 *International Journal of Industrial Organization*.

16 E Carroni, L Madio, and S Shekhar, 'Superstars in Two-Sided Markets: Exclusives or Not?' (2020) CESifo Working Paper No. 7535, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3243777 accessed 23 August 2020.

17 The incumbent might allow the rival access to the marquee product or premium content if the rival is already offering a high level of quality and the marquee product would not affect the average quality of the rival. Ö Bedre-Defolie and GC Biglaiser, 'Exclusive Dealing with a Marquee Seller and Platform Competition' (2020) Working Paper *mimeo*.

18 Like in H Karle, M Peitz, and M Reisinger, 'Segmentation Versus Agglomeration: Competition between Platforms with Competitive Sellers' (2020) 128:6 p. 2329–2374 *Journal of Political Economy*.

19 See <https://www.uber.com/au/en/drive/uber-pro/> and <https://www.lyft.com/blog/posts/lyftrewards> accessed 23 August 2020.

20 A Hagiu and J Wright, 'Data-Enabled Learning, Network Effects and Competitive Advantage' (2020) Working Paper *mimeo*.

platforms to foster such user investments since then users are more likely to single-home and less likely to switch to a rival.²¹

C. Free essential services

In Section II.A, we proposed to identify network effects that are essential to the core value provided by an MSP. Here, we build on this and argue that tipping is more likely if the essential services are free of charge.

At those platforms, where within-group positive network effects are essential to the core value (like social media platforms and search markets), users generating these network effects usually do not pay for the platforms' services. A zero price on the side generating essential network effects makes it harder for a smaller rival to challenge an established platform as it cannot 'undercut' the leading rival that benefits from more network effects. Thus, in order to compete, a smaller platform would have to provide significantly better quality in other dimensions than network effects, which is often difficult to achieve. This may explain why for two of the most prominent examples of platforms that have tipped, Facebook's social network and Google's general search, users do not pay for the core services.

On the contrary, consider MSPs where the core value of the platform is generated by matching two sides, that is, where cross-group network effects are essential, like job matching, dating, and real estate platforms. In these platforms, at least one user group pays directly to the platform for the services, and more market power of the platform will lead to a higher price on the side with positive prices, which in turn might provide an opportunity for a new entrant to undercut the incumbent on that side to become viable on the other side. Thus, a 'divide-and-conquer' strategy can help entry on matchmaker platforms and this might be a factor mitigating tipping. Indeed, in many markets with matchmaker MSPs, two or more platforms compete.

Offering free essential services is a decision of the platform and generates a key difference from a traditional single-sided market where dominant firms tend to raise their prices on the relevant market in order to exploit their market power.²² This gives entrants or small rivals an opportunity to expand by lowering prices. In MSP markets where the success is exploited on another side of the platform (e.g. with advertisement revenue), this key

factor mitigating tipping is absent on the side with free services.

D. Data-enabled learning

Competition of digital MSPs involves the use of data, which may foster tipping. More data collected from within-user search inquiries over time and across-user search inquiries help the search platform improve its search algorithm's predictive power, called 'data-enabled learning'²³. This improvement in the quality of the algorithm with users' data (both within-user and across-user learning) makes the platform more attractive for other users, thus generating a positive feedback loop fostering tipping. Moreover, the combination of within-user and across-user learning can create coordination problems (discussed in Section II.A.1), hindering the success of higher quality entrants or small rivals.

How data are used matters for their effect on tipping and welfare consequences of dominance due to data.²⁴ De Cornière and Taylor²⁵ find that 'Unilaterally Pro-Competitive (UPC)' data, which by definition induces the firm offering more utility to consumers (e.g. via data-enabled learning), leads to tipping in the market since the firm with data advantage has higher incentives to collect more data in every period. Thus, UPC, which is pro-competitive in one period, might be anticompetitive if we consider its dynamic effects.²⁶

E. Trust

Many MSPs, like online marketplaces or other matching platforms, need to enable trust between parties to be a viable and valuable platform. Review and reputation (R&R) systems are widely used to achieve this, like in eBay, Amazon, Uber, and Airbnb. Such mechanisms might make users more willing to actively transact on one platform (single-home) to build a history of good reputation. Thus, in marketplaces or matching platforms, where trust plays an important role for the quality of transactions and for the core value of the platform, reputation

21 We thank Julian Wright for raising this point.

22 Indeed, even in a single-sided market, offering the main product for free and making money from add-ons might be a profitable strategy for a multi-product firm, but for different reasons, like price discrimination by metering.

23 See n 20 above.

24 J Crémer, YA de Montjoye, and H Schweitzer, *Competition Policy for the Digital Era* (2019) European Commission. Luxembourg: Publications Office of the European Union.

25 A de Cornière and G Taylor, 'Data and Competition: A General Framework with Applications to Mergers, Market Structure, and Privacy Policy' (2020) CEPR, Discussion Paper DP14446.

26 It is important to note that these results are obtained under the assumption of short-sighted firms which do not consider future profits when making choices in a period. Moreover, data may also mitigate tipping. The authors document that UAC data, which by definition induces the firm to offer less utility to consumers (e.g. via personalized pricing), mitigates tipping. This is because the firm with the initial data advantage attracts fewer consumers, as it offers less consumer utility and thus its data advantage shrinks over time.

mechanisms might make it harder for a new platform or a small platform to challenge an established incumbent.

The core business of Airbnb offers high-quality matches between hosts and guests and also high-quality interactions before and after the match. Trust appears to be at the heart of its business, as otherwise it would be unpleasant to have an unknown guest staying at your property or an unknown host promising a property to rent at a location one has never been to, when one cannot verify the validity of these promises. Besides, the promise of reaching a wide variety of listings makes Airbnb unique from the guests' points of view, and trust mechanisms, like review and reputation systems, make repeated interactions even more attractive as users trust consistent feedback from many reviews more than the feedback of only a few reviews. Given that expected gains from multi-homing for guests are relatively low compared to the costs of multi-homing for short-term rental search, many guests might be willing to single-home on Airbnb, and this in turn might induce many hosts to also single-home on Airbnb.

F. Complementary offerings of platforms

Many digital platforms offer several complementary services and products (so-called 'digital ecosystems'). Most MSPs prefer to become digital ecosystems by acquiring or investing in complementary segments. The strategy to enter another MSP market by 'bundling own platform's functionality with that of the target's' is also known as 'platform envelopment'.²⁷ Enveloping a variety of services to the core products and services of a platform enables the platform to move its market position from its core market to the markets that it envelops. When there are positive cross-group network effects between users of these markets, the platform might grow faster and earn more. Besides, when the enveloped services are complementary for users, the envelopment strategy generates extra user benefit from using the platform.

For instance, Google moved its market position from a search engine by enveloping an advertising platform (Google Ads), Google suite services (Gmail, Maps, Calendar), YouTube, Cloud, News, and Nest. Google is currently trying to acquire Fitbit to envelop wearables and health data along with it.²⁸ Facebook moved its position from a social media network to an MSP by enveloping

advertising (Facebook Ads) and third-party application services (Facebook API), then third-party website services (FB Connect), instant messaging (WhatsApp), photo sharing (Instagram), and e-commerce (Facebook Marketplace). Amazon moved from a book retailer model to a marketplace model, enabling buyers and third-party sellers to interact. Amazon now offers Prime Video streaming services, Amazon Web Services, and more. Apple moved its market position from its main products (hardware products, like iPhone and iPad) by enveloping the services of providers in several different markets, including personal digital assistants (e.g. Palm Inc.'s Pilot), handheld games (e.g. Nintendo's Gameboy), eBook readers (e.g. Amazon's Kindle), music services (e.g. Spotify), and payment card services (e.g. Visa).

These digital ecosystems offer many benefits to consumers, mostly at zero or subsidised prices (prices below cost). Complementary offerings induce consumers to usually use one platform (single-homing) for a variety of services and enjoy the benefits of network effects.

For instance, users of Google obviously benefit from having complementary and well-connected (compatible) services of Google. This should make users more willing to stay with Google even if an alternative platform offers a better-quality service for one of Google's services. When many users prefer to stay with Google and use several different services on the platform, Google knows much more about these users (more and a variety of data is collected from the users' different interactions). This will enable Google to offer better-targeted advertising, so advertisers will be willing to pay more per click for an advertisement on Google (higher Google revenue per ad) and more advertisers will want to place their advertisements on Google. As a result, Google's market power in the advertising market should increase. This increase in Google's market power might be beneficial to consumers as well as advertisers in the short term. However, if it leads to higher prices in the advertisement market (e.g. because it is difficult to replace search advertisements by other advertisements), this may increase Google's incentive to maintain dominance in the primary market (general search), as it adds to the value of each search on its platform.

Even when consumers do not generate direct benefits from Google offering distinct services together (when there are no direct demand-side complementarities), Google might still benefit from collecting data on its users across these markets since this would improve its advertising business and might enable the platform to envelop other lucrative markets. In this case, Google's presence across different markets and spillovers generated via data collection might not directly benefit its users and

27 T Eisenmann, G Parker, and M van Alstyne, 'Platform Envelopment' (2011) 32 p. 1270–1285 *Strategic Management Journal*; see also D Condorelli and J Padilla, 'Harnessing Platform Envelopment in the Digital World' (2020) 16:2 p. 143–187 *Journal of Competition Law & Economics*.

28 https://ec.europa.eu/commission/presscorner/detail/en/ip_20_1446 accessed 23 August 2020.

might even harm them if this data use generates some consumer welfare loss, for example, due to too much advertising, customised pricing, personalized offers, or privacy concerns.

To illustrate the potential effect, consider the proposed merger of Google with Fitbit (wearables). Arguably, this merger would be unlikely to generate important, direct demand-side complementarities for users, as existing Google services do not make Fitbit wearables more valuable and vice versa. However, such a merger may lead to a significant data advantage for Google in the healthcare market by combining the search and other data of Google users with healthcare data. This would then enable Google to offer better advertisement-targeting and thus improve its market power in the online advertising market. Further, Google could offer personalized healthcare products and services to its users, like addiction products, health insurance, personalized employment offers, personalized financial products, and so forth. This personalization might not be to the benefit of consumers if, for example, some find themselves being exploited due to self-control problems, having no insurance coverage, no job, or higher insurance prices and lower wages due to existing health conditions and habits. This could result in Google's dominance in the healthcare market, either by enabling insurance companies, employment agencies, and financial brokers to target Google users via personalized offerings, advertisements, and so forth, or by enveloping an insurance business to expand its dominance from existing Google markets to the healthcare market. Privacy issues related to commercialization of very personal healthcare information of users could add further concerns for society and regulators, which would have to be offset by efficiency gains.²⁹

Bundling discounts create complementarity even between independent products and services in terms of cost savings from buying them together. Bundling discounts thereby raise switching costs endogenously, reducing the extent of multi-homing.³⁰ Tying or bundling might enable a dominant firm to leverage its market

power from one market to another where it faces competition.^{31, 32}

On the other hand, we also need to acknowledge the possibility that moving into complementary segments might allow a dominant platform to challenge another incumbent in a different market.³³ For example, Google tried to enter the social media market via Google Plus to challenge Facebook, and Microsoft entered the search market with its Bing to challenge Google. Even if these attempts were not successful to prevent the dominance of Facebook in the social media market and Google in the general search market, it is reasonable to expect that a dominant platform in one market could more easily be challenged by a platform that is dominant in another market if the latter enters into the former platform's market via its complementary offerings. For instance, Google's entry into the mobile operating system market with Android has generated significant competition with Apple, which could otherwise be an unchallenged dominant platform with its integrated operating system on Apple devices.

III. Factors mitigating tipping

We identify six key factors that mitigate tipping in markets with platforms: negative network effects, user heterogeneity, 'local' network effects, multi-homing, horizontal differentiation, and innovation.

We consider factors that lead to market segmentation, like user heterogeneity, 'local' network effects, horizontal differentiation, and innovation, as factors mitigating tipping, although one could argue that in a segmented market the segments have tipped. These factors leading to more market segmentation likely mitigate full-scale market tipping since then it is often easier to challenge a strong platform in a neighbouring segment.

29 See Z Chen, C Choe, J Cong, and N Matsushima (2020), 'Data Driven Mergers and Personalization' Working Paper *mimeo*, for potential welfare concerns and potential theories of harm due to a potential Google-Fitbit merger. In this respect, see also M Bourreau, C Caffara, Z Chen, C Choe, GS Crawford, T Duso, C Genakos, P Heidheus, M Peitz, T Roende, M Schnitzer, N Schutz, M Sovinsky, G Spagnolo, O Toivanen, T Valette, and T Vergé 'Google/Fitbit Will Monetise Health Data and Harm Consumers' (2020) CEPR Policy Insight No. 107.

30 M Armstrong and J Vickers, 'Competitive Non-Linear Pricing and Bundling' (2010) 77:1 p. 30–60 *The Review of Economic Studies*.

31 See inter alia, MD Whinston 'Tying, Foreclosure and Exclusion' (1990) 80:4 p. 837–859 *American Economic Review*; DW Carlton and M Waldman, 'The Strategic Use of Tying to Preserve and Create Market Power in Evolving Industries' (2002) 33:2 p. 194–220 *The RAND Journal of Economics*; and B Nalebuff, 'Bundling as an Entry Barrier' (2004) 119:1 p. 159–187 *The Quarterly Journal of Economics*. For a review, see P Rey and J Tirole, 'A Primer on Foreclosure' (2007) 3 p. 2145–2220 *Handbook of Industrial Organization*.

32 This was the main concern behind Microsoft's bundling of its operating system with Internet Explorer in cases in the USA and in Europe (Case COMP/39.530—Microsoft (Tying)). Recently, the EC (COMP/40099) accused Google of leveraging its dominant position in Google Play (the app store for Android devices) to other markets where Google faces some competition (search, maps, etc.) when Google forced Android manufacturers to include Google apps as default if they want to operate Google Play, which is the only way for users to access apps on Android phones. The EC banned this bundling practice of Google and fined Google for abusing its dominant position.

33 See T Eisenmann et al. (n 27 above).

A. Negative network effects

Network effects could also be negative; attracting more users on one side might also generate negative externalities for other users on the same side due to 'congestion' or 'competition' effects, like in a matching platform where too many users on one side makes it less likely for a match to occur, or on an e-commerce platform where sellers compete to sell to buyers. Another example is a social network that accepts many users by an 'open' user access regime, and then the value for other users deteriorates because some users share inappropriate content.

These are examples of 'negative within-group network effects', which may mitigate tipping by counterbalancing gains from cross-group positive network effects.³⁴ One more seller on the platform lowers prices when sellers are imperfect competitors. This in turn attracts more buyers to the platform, which benefits sellers (positive cross-group network effects). The net effect of one additional seller on other sellers depends on which effect dominates; the negative within-group network effects versus the positive cross-group network effects.³⁵

When negative within-group network effects are strong, users might choose to single-home on different platforms in order to avoid each other and to mitigate fierce competition against users on the same side.³⁶ This would generate endogenous segmentation of platforms.³⁷

In some instances, MSPs can address these issues to lower the impact of negative network effects. Platforms might try to influence the extent of negative within-group network effects by designing their access rules and monetization terms to users. For instance, they can limit entry of competing sellers or providers via terms of entry (membership fees, conditions, etc.), actively approach users with positive (rather than negative) cross-group externalities (like anchor stores in shopping malls), and design transaction fees to influence the level of seller competition.³⁸ Indeed, a small MSP can successfully compete against a large MSP by adopting a business model that limits the extent of negative network effects via controlling the entry of users to its platform. For instance, restricting entry in matching platforms leads to a higher likelihood of being matched to someone.

This generates business model differentiation by self-selecting user types that are more willing to pay for reduced competition and so enables the small platform to charge higher prices. As a result, both platforms coexist in the market. Thus, business model differentiation by restricting choice among users might mitigate tipping.³⁹

To sum up, negative network effects can slow down the growth of the leading MSP and offer an opportunity to rival MSPs to compete via different business models. Both effects mitigate tipping.

B. Heterogeneity of users and local network effects

If users differ in the value they get from network effects (e.g. a successful match), an incumbent platform might prefer to set a higher price to attract high-value users and leave low-value users to the entrant (segmented market). Though one may argue that in such cases each 'segment' tipped, there is one key difference between full market (or international) tipping and different platforms dominating different segments. In the latter, a dominant platform in one segment may be a more apt challenger to the platform dominating another segment.

Many MSPs that operate in many regions or countries generate network effects mostly on a local basis, where 'local' can be taken to mean, for example, a municipality, a city, a country, or a language region. Food delivery MSPs, dating MSPs, real estate MSPs, or social network MSPs are examples of platforms with strong local network effects. Local network effects in general can mean users on one side benefit from other users (either on the same side or on the other side) as long as others have similar characteristics, preferences, or both. Heterogeneous user groups with local network effects might therefore generate clusters of users with similar preferences and characteristics, where clusters differ from each other and network effects are weaker across different clusters than within clusters. If such heterogeneity exists, and firms cannot price discriminate between the different user segments, the competitive outcome may be a segmented market where each MSP sells to a different segment.⁴⁰

Even if a platform can set different prices to different users, the local nature of network effects is a key factor that prevents full-scale tipping. If there are city- or country-level network effects, it will naturally lead to

34 See P Belleflamme and M Peitz (n 15). Also, see n 18.

35 See P Belleflamme and M Peitz (n 15). Also, see n 17.

36 See n 18.

37 Indeed, such effects are well established in the literature that studied the benefits and costs of agglomeration, see, for example, G Ellison and D Fudenberg 'Knife-Edge or Plateau: When Do Market Models Tip?' (2003) 118:4 p. 1249–1278 *The Quarterly Journal of Economics*.

38 MR Baye and J Morgan, 'Information Gatekeepers on the Internet and the Competitiveness of Homogenous Product Markets' 91:3 p. 454–474 (2011); see also S Anderson and Ö Bedre-Defolie, 'Hybrid Platform Model' (2020) Working paper *mimeo*.

39 H Halaburda, M Piskorski, and P Yildirim, 'Competing by Restricting Choice: The Case of Search Platforms' (2018) 64:8 p. 3574–3594 *Management Science*.

40 A Banerji and B Dutta, 'Local Network Externalities and Market Segmentation' (2009) 27 p. 605–614 *International Journal of Industrial Organization*.

multiple entrants becoming dominant in specific cities or countries, given that a firm cannot usually scale to all cities in the world at once. For instance, e-commerce marketplaces for second-hand goods: in the USA, it is eBay, in Singapore it is Carousell, in Japan it is Yahoo, in New Zealand it is Trademe, in China it is Xianyu, and in Germany it is eBay Kleinanzeigen. Similarly, each country or region has its own ridesharing platform: Didi in China, Grab in South East Asia, and so forth. Even if Uber and Lyft compete in the USA, their competition is city by city. This is in contrast with Airbnb, where network effects are truly global. This might explain why Airbnb is globally dominant and faces far fewer and much weaker competitors.⁴¹

Thus, full-scale market tipping is mitigated when consumers differ in their value from network effects, when there are local network effects, where platforms cannot or do not price discriminate between different segments, or a combination of these factors.

This may explain why matching platforms, where participants care about with whom or with what they are matched to, often have several (smaller) MSPs focusing on different segments (e.g. 'local' real estate platforms, same sex dating platforms, or academic job search platforms).

Picking a niche may be an entry opportunity to challenge an incumbent MSP on a broader basis. For instance, Snapchat, a social media network, targeted young users with innovations that added features attractive to this audience (sharing of photos, videos, and stories). Despite this focus on just one age group, it was at some point considered as a serious threat to Facebook.⁴² Similarly, TikTok focusing on 'real people' sharing their own videos might generate a significant competitive threat to Facebook.

C. Multi-homing

Whether users on one side multi-home depends on the costs and benefits of multi-homing. However, it is insufficient to just study actual payments or the opportunity costs of the time that multi-homing requires. More factors need to be considered:

- **'Strength' of network effects:** Users may only accept the costs of multi-homing if they value getting access

to many users on the other side, or transacting with the other side (network effects) a lot.⁴³

- **Degree of multi-homing/single-homing on the other side:** The degree of multi-homing on one side is influenced by the degree of multi-homing on the other side. Consider two identical two-sided platforms where the cross-group externalities are essential and that differ only in their number of users. For instance, consider Uber and Lyft, where both the drivers' side and the riders' side multi-home, so the two companies are basically reduced to competing on price, which may explain why they are making big losses with no end in sight.⁴⁴ If users on one side single-home, each platform will be the bottleneck (gatekeeper) to reach its single-homing users and thus exert market power over the side where users multi-home, while competing fiercely for the single-homing side, so-called 'competitive bottlenecks'.⁴⁵ In general, the number and identity of single-homing users on one side may be a differentiating factor between platforms, and this induces the other side to multi-home more. This might provide incentives for platforms to take some actions to incentivise users to single-home (as discussed above). When users on both sides multi-home, the interdependence between the platform's strategies across the two sides reduces.⁴⁶ At the extreme, when users do not generate additional network effects from meeting the same user on another platform, pricing on one side does not depend on the other side.

- **Degree of differentiation:** If platforms are differentiated in dimensions other than network effects (e.g. variety of products or services they offer; quality of match, interactions, or products; and better search or recommendation systems), even if all users on one side multi-home, users on the other side might still prefer to multi-home to benefit from other differentiating factors unrelated to network effects. Hence, more differentiation between competing platforms in general mitigates tipping.

- **Idiosyncratic tastes (horizontal differentiation):** Users might differ in the assessment of the value

41 We thank Julian Wright and Andrei Hagiu for emphasising this point and providing us with several examples.

42 GG Parker, MW van Alstyne, and SP Choudary, *Platform Revolution: How Networked Markets are Transforming the Economy and How to Make Them Work for You* (Chapter 3, New York WW Norton & Company 2016).

43 See P Belleflamme and M Peitz (2019b), p. 21, n 15 above; see also, TD Jeitschko and MJ Tremblay, 'Platform Competition with Endogenous Homing' (2020) 61:3 p. 1281–1305 International Economic Review.

44 We thank Andrei Hagiu for this example.

45 M Armstrong, 'Competition in Two-Sided Markets' (2006) 37:3 p. 668–691 The RAND Journal of Economics. See also, M Armstrong and J Wright (n 18).

46 H Halaburda and Y Bakos, 'Platform Competition with Multi-Homing on Both Sides: Subsidize or Not?' (2020) Management Science (forthcoming). NET Institute Working Paper No. 19-12, Available at SSRN: <https://ssrn.com/abstract=3468457>, accessed 6 October 2020.

of different types of users on the other side. If platforms offer different types of users on the other side, these idiosyncratic tastes differentiate platforms horizontally. For example, if a real estate platform offers big family houses for rent and another focuses on smaller (student) accommodation, and users on the other side (e.g. students and families) differ in their preferences for the type of real estate they are looking for, these platforms are horizontally differentiated. This implies that some landlords may start offering their product only on one platform (single-homing). As a result, more users on the other side may then multi-home to ensure they do not miss anything. As a final outcome, there may be some single-homing and some multi-homing users on both platforms.⁴⁷ Thus, horizontal differentiation can often be an opportunity for entrants or small rivals to stay in the market and mitigate tipping.

- **Quality differences (vertical differentiation):** When platforms are vertically differentiated in terms of quality (different from network effects), single-homing on one side might lead to less multi-homing (more single-homing) on the other side if single-homing users make existing differentiation between platforms stronger. For example, if a real estate platform offers better search and filtering options (e.g. more granular filters that include chimney, floor level, or ceiling height) and it therefore attracts more single-homing property hunters, it will in turn encourage single-homing of landlords and agents. This is particularly relevant if user prices are zero for the single-homing side (property hunters, in our example). In that case, single-homing on one side will trigger single-homing on the other side and foster tipping in favour of the established platform.

The discussion shows that the evolution of multi-homing requires a careful analysis of several factors. Multi-homing may also be hindered by activities of MSPs as Section II.B discusses.

⁴⁷ See M Armstrong (2006) n 45 above; see also, JC Rochet and J Tirole, 'Platform Competition in Two-Sided Markets' (2003) 1:4 p. 990–1029 *Journal of the European Economic Association*; and JC Rochet and J Tirole, 'Two-Sided Markets: A Progress Report' (2006) 37:3 p. 645–667 *The RAND Journal of Economics*.

D. Innovation

Platforms constantly reconsider the way they operate and they can actively influence their quality through innovation, which may affect interaction of the users (in which case the innovation is often IT-related) or the business model, for example, how to design the user access rules on the different sides of the platform, which side to charge a price to and how much, pricing a premium version versus a basic version, bundled discounts, loyalty discounts, and so forth. For instance, Apple controls entry of apps into its App Store much more than Google controls Google Play apps. This makes sense since Google entered the market later and thus needed to establish a large base of apps to be viable against the incumbent (Apple). Similarly, when Apple entered the market of BlackBerry, Apple implemented a much more open system than BlackBerry. Thus, at the launch of a platform, being open enables the platform to reach a critical mass of users, whereas in the long term, platforms might want to control quality via their access rules. One platform can differentiate itself from another by controlling the access of third-party providers more strongly and thus by controlling the quality of products or services it allows on the platform. This differentiation might enable a small platform to be viable against an established incumbent. For instance, some e-commerce platforms, like Zalando in fashion and Etsy in arts and crafts, curate their providers carefully to control quality and compete successfully against Amazon, which has very loose control over access of its third-party providers.

IV. Implications for competition policy

Policy makers, including the EC, are currently considering various initiatives to prevent tipping in markets with MSPs. This illustrates the need to consider a combination of many factors that might interact in different ways. This makes the identification of markets that are likely to tip a challenging task.

A. A 'tool' to assess likelihood of tipping

Our discussion of factors influencing tipping in markets with MSPs suggests that the following questions should be particularly relevant for such a ranking (where tipping is less likely if the question is answered with yes):

I. Are there factors that diminish the value of a growing MSP?

This can happen when an increase in a platform's user base and market power leads to countervailing effects that

can slow down or stop the forces fostering tipping. Candidates for countervailing effects would be higher prices on one side when essential network effects are across groups (see Sections II.A and II.C) and negative network effects within a user group, like competition between sellers or congestion effects in matching platforms reducing the likelihood of being matched with a user on the other side (see Section III.A).

2. Are there factors that ease smaller rivals' user acquisition?

This is the case when (active) multi-homing (on all sides) is feasible, when moving from one platform to another is easy, or both (see Sections II.B and III.C). R&R systems to establish long-term trust could also raise switching costs significantly for users, leading to many users single-homing (see Section II.E). Similarly, personalized services relying on within-user, data-enabled learning could increase switching costs (see Sections II.A and II.D). If a large fraction of users or particularly valuable users 'depend' heavily on an established platform, it would not be easy for a small platform to acquire users. Similarly, if the dominant MSP(s) takes some actions to prevent multi-homing (e.g. exclusivity clauses with key providers) or makes it more costly to multi-home (e.g. via personalized offerings, tying, bundling, or loyalty discounts), again it would be difficult for a small rival to steal users from the established platform(s) (see Section II.B).

3. Are there factors that make smaller rivals attractive to at least some users?

For instance, when platforms are horizontally differentiated (idiosyncratic tastes for platforms, see Section III.C), users differ in their value from network effects, and there are local network effects (see Section III.B), and smaller rivals can be present in some specialised (niche) markets. Moreover, when smaller rivals can easily replicate the core value provided by the leading platform(s), they can challenge the established platforms more easily.

4. Is it the case that no MSP in the market under consideration benefits from the activities or a strong position in another market?

The absence of such multi-market players makes tipping less likely compared to those (many) markets where they are active; having a multi-market position may strengthen the MSP and may therefore foster tipping. Benefits to a multi-market MSP could arise from strong demand-side complementarities between the markets it operates in (see Section II.F), supply-side spillovers or revenue gains from

having access to data across different markets (see Section II.D), tying products or services of one market to another, or from envelopment strategies (see Section II.F).

By identifying these factors, we have indirectly captured the entire list of issues discussed in the literature review and the covered examples at the cost of leaving out a lot of important detail. Even though the observed differences between markets that have tipped and others that have not tipped would broadly fit into our classification, we do not claim that any market with MSPs is entirely safe against tipping.

It is challenging to rank markets with MSPs by their tendency to tip. It is even more challenging to identify a specific MSP that will emerge as the 'winner', a so-called 'tipping candidate', *ex ante* (before tipping). We agree with policy reports proposing that a multi-market presence and market power in other markets can make an MSP a more likely candidate for tipping (where our fourth criteria would be violated) compared to an MSP present in only one market and has similar characteristics otherwise.⁴⁸ We do claim, however, that without a multi-market platform, it may be difficult for regulators to identify the tipping candidates simply based on characteristics.

This suggests that it may be useful to analyse, firstly, the general tendency of the relevant MSP market to tip (as discussed above); secondly, to investigate whether multi-market MSPs stand out; and thirdly, to analyse market outcomes and trends.

The latter could include the relative market position at the time of investigation, that is, whether a potential tipping candidate is leading by a distance and the recent trends in the relative market position, that being, whether the potential tipping candidate has grown fast. Further dynamic measures may be relevant to identify tipping candidates (e.g. the speed of innovation, the increase in variety, or single-homing over time); however, such measures would be MSP-dependent and there is no established measure available.

Competition authorities must bring the two elements (the tendency of an MSP market to tip and the identification of a tipping candidate) together and the development of a competition tool should consider both the generic likelihood of tipping and the identification of tipping candidates.

⁴⁸ See n 2 and 3.

B. Welfare effects of tipping in markets with MSPs

Besides identifying the likelihood of tipping, the authorities need to assess the expected welfare impact of tipping. These are essential before considering intervention. In assessing the expected welfare impact of tipping, the authorities will have to take a stance on the short-term welfare gains versus long-term welfare losses.

Most of the factors that facilitate tipping will also lead to short-term welfare benefits when the market is tipping: Positive network effects, economies of scale and scope, trust mechanisms, and the addition of complementary services all lead to immediate welfare benefits. These short-term welfare benefits have to be traded off against the long-term harm to welfare created by tipping, like reduced quality and lack of innovation, in addition to higher prices.

As discussed in Section II.F, tying could be used as a strategy to leverage market dominance from one market to another, also known as envelopment strategies. Thus, potential anticompetitive effects of reduced competition in the target market should be compared to potential gains for consumers from the platform's activities across different markets (e.g. whether there are direct complementarity benefits for consumers). On the other hand, in two-sided markets, tying might increase welfare, as it can be used as a strategy to solve user coordination failures at the launch of a platform when non-negative prices are not feasible.⁴⁹ Besides, tying might induce aggressive competitive pricing by a rival platform. However, this might be avoided, and tying becomes profitable when non-negative prices also constrain rivals' prices.⁵⁰ Tying complementary products might increase total welfare by increasing consumers' multi-homing, benefiting content providers.⁵¹

All factors that facilitate tipping or more dominance of the platform on one side might trigger tipping on different sides of the market when there are positive cross-group network effects. For instance, tipping on the user side will reduce competition on the advertiser side of an advertisement-supported media or search platform. This in turn might lead to surplus losses due to the reduced

competition on different sides of the market. Thus, these potential losses on other sides should also be accounted for when evaluating whether any facilitating factors are beneficial to the total welfare even in the short term.

A significant factor in the potential harm from tipping depends on the barriers to entry and switching costs generating the incumbency advantage. For instance, even if a firm has grasped a market share of above 60 per cent, without important entry barriers or switching costs, it needs to remain alert and innovate constantly in its market; then tipping is less likely to lead to harm. However, if an MSP obtains such an established position on the side where it generates the essential network effects and its market position is well protected by entry barriers and high switching costs, the tipping is likely to generate major welfare losses.

C. How and when to intervene to prevent tipping

There are several ways policy makers can change the options for competition authorities to intervene if they see a need.

The current discussion very much focuses on adapting the intervention thresholds in order to better target norms at MSPs already with a strong market position in one market (to prevent them from tipping in other markets), or to lower the intervention threshold to capture tipping candidates before they become dominant (e.g. by referring to relative power or intermediary power).⁵²

In addition, policy makers have been discussing an *ex ante* ban of some practices (like self-favouring on hybrid platforms that sell their own products or services along with third-party products or services, making interoperability of products or services or portability of data more difficult).⁵³

While a full discussion of these initiatives deserves another paper, we would like to highlight a potential pitfall of these attempts to the extent that such initiatives constrain the business model of smaller MSPs; for example, by forcing all MSPs to enhance competition 'on the platform', these initiatives may violate our third criterion and foster, rather than prevent, tipping. This is because a business model with limited competition on the platform may allow the attraction of high-quality users and thereby lead to quality differentiation that benefits the small MSP

49 A Amelio and B Jullien, 'Tying and Freebie in Two-Sided Markets' (2012) 30:5 p. 436–446 International Journal of Industrial Organization.

50 DS Jeon and JP Choi, 'A Leverage Theory of Tying in Two-Sided Markets with Non-Negative Price Constraints' (2020) American Economic Journal: Microeconomics (forthcoming). <https://www.aeaweb.org/articles?id=10.1257/mic.20180234&&from=f>, accessed 6 October 2020.

51 JP Choi, 'Tying in Two-Sided Markets with Multi-Homing' (2010) 58:3 p. 607–626 The Journal of Industrial Economics; see also, JP Choi, B Jullien, and Y Lefouili, 'Tying in Two-Sided Markets with Multi-Homing: Corrigendum and Comment' (2017) 65:4 p. 872–886 The Journal of Industrial Economics.

52 See n 2.

53 For the EC initiative, see EC Press Release, 2 June 2020, https://ec.europa.eu/commission/presscorner/detail/en/ip_20_977, accessed on 23 August 2020; see also n 10; for an earlier report suggesting similar initiatives for Germany, see n 2; for initiatives in other jurisdictions, see n 3.

and thereby lowers the probability of the market to tip (see Sections III.A and III.C). Thus, there might be a tension between the norms to foster competition on the platform and those that foster competition between platforms. Thus, to prevent tipping, it is crucial to lower intervention thresholds to target tipping candidates rather than all firms with relative market power.

This is not to say that relative market power is irrelevant. Our second criterion supports taking into account the relative power of an established platform vis-à-vis a large fraction of users or highly-valued users (like marquee products or premium content) since such a strong dependence will make it harder for a small platform to acquire users from the established one (see also Section II.B).

On the other hand, it is important to note that any platform having some single-homing users might fall under the category of having some dependent users since the platform provides a unique way of accessing its single-homing users (see Section III.C). Thus, relative power definition needs to be adjusted to exclude small MSPs as having market power since otherwise restrictions on these small MSPs might foster dominance of leading platforms and hence tipping.

Following our discussion in the previous sections, envelopment or tying strategies should be allowed to be used by small platforms which do not have a dominant position in any market since this is likely to facilitate competition in markets with MSPs, in particular, when it is used to overcome an entry barrier or challenge a dominant incumbent. However, a dominant platform should be required to provide efficiency or demand-side direct gains for consumers to be able to use such a strategy (efficiency defence).

Given that multi-homing can mitigate tipping tendencies of markets with MSPs, the recent policy proposals are right in their attempts to prohibit activities by all or some MSPs that may foster single-homing. Our second criterion, along with the discussion in Sections II.B and III.C, also suggests that established platforms should not be allowed to use actions that prevent multi-homing (e.g. exclusivity clauses) or raise costs of multi-homing endogenously (tying, bundling, loyalty discounts,

and incompatibility of products or services across platforms) unless they provide sufficient evidence that these practices benefit consumers (efficiency defence).

V. Conclusion

In this article, we review factors that foster and mitigate tipping as discussed in the academic literature and illustrated by many examples. Based on this review, we identify four key questions that may help ranking markets with MSPs by likelihood of tipping. These questions look for factors that (i) diminish the value of a growing MSP, (ii) ease smaller rivals' user acquisition, (iii) make smaller rivals attractive to at least some users, and (iv) check whether a platform benefits from activities or a strong position in another market.

Some characteristics, like multi-market presence and recent growth trends, might give us a hint about tipping candidates. However, we explicitly emphasise the challenge to identify tipping candidates *ex ante* (before tipping) when the markets are dynamic and unpredictable. Thus, further research is required to improve our understanding of characteristics of tipping candidates along with the relative importance of, and the interrelations between, the factors that foster or mitigate tipping.

Factors that foster tipping may well imply consumer benefits and welfare gains if there is a monopolist platform rather than competition of several platforms: positive network effects, data-enabled learning, trust mechanisms, economies of scale and scope, and complementary services or products. It is therefore important to develop a clearer understanding of short-term welfare benefits of concentration in markets with MSPs and how they can be traded off against the long-term welfare losses if established MSPs in a tipped market exploit their (super) dominant position by, for example, degrading quality, cutting innovations, raising prices, and so forth. We call for more research to measure these short-term welfare benefits and long-term welfare costs in order to guide policy makers in identifying when to intervene to prevent tipping.

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