



**DIRECTORATE FOR FINANCIAL AND ENTERPRISE AFFAIRS
COMPETITION COMMITTEE**

**DAF/COMP/WD(2009)69
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ROUNDTABLE ON TWO-SIDED MARKETS

-- Note by the Delegation of the European Commission --

This note is submitted by the Delegation of the European Commission to the Competition Committee FOR DISCUSSION at its forthcoming meeting to be held on 9 - 11 June 2009.

JT03265566

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TWO-SIDED MARKETS

-- Note by the European Commission --

1. Introduction

1. Two-sided platforms refers to a situation where two distinct user groups interact with each other through a common platform and the value of joining the platform depends on expectations about the opposite network size¹. A classic example is provided by operating systems. In deciding whether or not to purchase an operating system users consider the number of software applications that run on that OS, whereas software developers consider the number of potential users running that OS.

2. Other examples of two-sided platforms can be found in various industries such as credit cards (cardholders and merchants); real estate brokerage (renters and landlords), internet portals and search engines (sites, surfers); magazines (readers and writers); yellow page directories (readers and businesses); night clubs (men and women); shopping malls (shoppers and shops), publication software (authors, readers), videogame consoles (gamers and developers), as well as various types of intermediation services such as matching and employment agencies, auction houses, service vouchers networks, payment systems, some telecommunication systems, scientific journals, and many others.

3. Typically, these two distinct customer groups cannot contract directly. The transaction costs of the customers individually reaching enforceable agreements to internalise network effects are too high, and would result in free rider problems. As a result a third-party usually creates a place or space – a platform – where the different groups of consumers/users can get together. In such situations, the need to get on board agents on all sides of the platform creates a so-called “chicken and egg” problem in that members of each group are willing to participate in the market only if they expect many members from the other side to participate². Yellow pages, internet portals and auction houses, to name a few undertake this crucial function – they provide a platform for the two or more sides to get together and the market to develop. Following Evans (2004), "a platform constitutes the set of the institutional arrangements necessary to realise a transaction between two users groups".

4. The literature on two-sided platforms (e.g. Rochet and Tirole, 2003 and 2006; Armstrong, 2006), builds on the older literature on network effects in non-intermediated trade (e.g., Katz and Shapiro, 1985) and, in particular, on indirect network effects (e.g., Chou and Shy, 1990; Church, Gandal, and Krause, 2002). Initially models typically assumed that agents on each side of the platform (such as sellers) do not compete with each other to be matched with agents on the other side (such as buyers) and agents on either

¹ In a recent paper Ordober (2007) argued that to the uninitiated, the concept of a two-sided platform is probably confusing and offers little additional analytical insight, at best. After all, is it not the case that all markets have two sides, namely buyers and sellers? Ordober suggests to use a more informative description, namely: markets with two-sided platforms. In this paper we follow this proposal and refer consistently to two-sided platforms, as opposed to two-sided markets.

² See Caillaud and Jullien, 2003.

side are charged for access and usage of the platform. The objective of this early strand of the literature is to analyze the pricing structure on both sides of the market when the platform is owned by a single owner.

5. However, as Nocke et al (2006) observe there exist widely differing institutional arrangements or ownership structures of platforms. The platform may be owned by a monopoly intermediary, by many small intermediaries, or by agents active on each side of the platform, such as buyers and sellers. Dispersed platform ownership may further be distinguished by contractual arrangements and property rights: incumbent platform owners may or may not have the right to restrict entry onto the platform.

6. The most recent and now burgeoning literature on two-sided platforms, addresses the challenging, and complex case of platform competition: for example, between alternative payment systems, newspapers and TV channels, intermediation services or shopping malls. A key characteristic of platform competition is multidimensionality. Whereas, in a conventional single-side market, customers may be attracted through lower prices and higher utility in one market, in a two-sided context it is possible to compete in one or the other side.

7. Note also that belonging to a common platform does not rule out the emergence of "within-platform" competition, (that is, competition between agents within the same platform to be matched with agents on the other side). For example, payment card networks set compensation fees between bank members, but banks remain free to compete, having freedom in the choice of final prices for their services. A shopping mall is a two-sided platform, attracting both customers and shops but shops may still compete among themselves.

8. Two-sided platforms present certain practical problems. The complexity primarily arises from the presence of two (or more) unique, but interdependent, classes of agents or customers. The analysis needs to account for (1) the responses of two (or more) distinct sets of agents to platform owners (2) platform owners responses to two sets of agents, and (3) the responses of one set of agents to changes in the others' behaviour and vice versa - particularly as demand conditions change on each side. This pattern of cross-responses will generally affect each step of standard antitrust analysis, from product market definition, the competitive assessment, entry, efficiencies, etc. However, as argued in this contribution, this does not imply a need to abandon the typical tools that one applies in the analysis of single-sided markets, only to adapt them.

9. At the outset, it is necessary to point out that the EU Commission, possibly like other competition authorities, has not yet acquired any significant experience on the assessment of competition cases involving two-sided platforms. As a result this OECD Roundtable contribution, unlike past contributions in other topics, does not provide a summary of the EU Commission's case practice regarding the competitive assessment of two-sided platforms. There are three reasons for the limited relevance of "two-sidedness" in past competition cases:

- First, and despite the prevalence of two-sided platforms in certain sectors, the large majority of competition cases concern, in fact, standard single-sided markets where sellers interact directly with buyers, at one or more levels of the supply chain. Moreover, many two-sided platforms consist of numerous, relatively small firms in what would be called competitive markets such as nightclubs, dating agencies, estate agencies and employment agencies where anti-competitive behaviour is relatively uncommon unless there is some form of coordinated activity, for example through industry associations.
- Second, and as pointed out by Roson (2005) in his "tentative survey", most of the theoretical work in two-sided platforms is still nascent. Most academic contributions, including some now considered seminal papers, have not yet been published (or only recently) in scientific peer-

reviewed journals. Quite fittingly, they circulate as working papers or unpublished manuscripts, exploiting the internet and electronic repositories as a platform that brings together researchers and readers, including antitrust practitioners. Indeed, there is still some lack of general consensus about what constitutes key characteristics of two-sided platforms, small changes in the modelling assumptions appear to lead to significant differences in the results, making it difficult to obtain general policy recommendations.

- Finally, empirical research is lacking. The very few available studies address specific issues of specific two-sided platforms. More general empirical research is indispensable.

10. Thus, it is still early for a competition authority to adopt any definite views, let alone concrete policies or assessment methodologies, concerning the application of competition policy in cases involving two-sided platforms. Hence, the views and comments put forward in this paper are intended to add to the on-going debate and cannot be read as providing guidance on the EU Commission's past or future assessment of competition cases involving two-sided platforms.

11. It follows from the above that this contribution has modest goals. Section 2 identifies the key features that define two-sided platforms. Section 3 reflects on some important insights derived from a selected review of the economic literature regarding assessment of competition cases involving two-sided platforms. It draws heavily from the sources cited in the reference list but is intended to provide a roadmap of the most relevant insights that emerge from the literature from the perspective of a competition policy enforcer. Section 4 provides a detailed summary of some recent cases where the EU Commission has taken into consideration, explicitly or implicitly the existence of a two-sided platform.

2. Defining features of two-sided platforms

12. Following both Evans (2004) and Reisinger (2003) a platform (or market) is said to be two-sided "at any point in time" if there are,

- two distinct groups of agents or customers;
- the value obtained by one class of customers increases with the number of the other class of customers; and
- an intermediary is necessary for internalizing the externalities created by one group for the other group.

13. The relevance of the two-sided nature of platforms depends importantly on three elements³:

1. indirect network externalities
2. pricing structure and the
3. pattern of adhesion ("homing") to the platform.

14. Under specific circumstances, and in particular when indirect network effects are negligible, the standard "single-sided" analysis of each side of the platform in isolation represents a simpler analytical framework and a reliable proxy.

³ See Vannini (2008)

2.1 *Inter-group network externalities*

15. One important characteristic of two-sided platforms is the presence of network externalities between the two different groups using the platform. Network externalities are said to exist when consumer utility in a certain market depends (usually, in a positive way) on consumption of the same good or service by other agents. Markets with network externalities have been widely analyzed, especially since the contributions of Katz and Shapiro (1985), Farrell and Saloner (1985), and others. However, in this literature, users belong to the same group and externalities are "intra-group" externalities whereas in a two-sided platform there are two different groups of users, and externalities are "inter-group" externalities⁴.

16. Inter-group network externalities do not depend on consumption of agents in the same class (for example, consumers of the same product), but on consumption of different, but "compatible", agents on an opposite side of the platform. For example, in joining an intermediation (or exchange) service platform, a buyer will take into account the number of potential sellers using the same platform, in addition to the price she should pay. The number of readers of a newspaper or magazine (or the audience of a TV broadcast) tends to attract advertisers and the number of customers of a shopping mall tends to attract the suppliers of products to be sold there⁵.

17. Since the opposite network size is affected by the specific price applied to that side, the indirect utility for an agent in a two-sided platform depends on *both* prices. However, if agents are allowed to make side-payments, the usage fee applied to each of them would play a rather minor role in the adoption choice. For example, if a buyer and a seller would be free to negotiate a transaction price, only the total surplus, net of all transaction costs of all sides, would matter. Any cost shift, for example, from the seller to the

⁴ Katz and Shapiro (1985) also distinguish between direct and indirect network effects. A direct effect arises when there is "a direct physical effect of the number of purchasers on the quality of the product" (p. 424). Katz and Shapiro (1994) term networks with a direct physical effect "communication networks", and (not surprisingly) the canonical examples are communication technologies such as telephone and email networks and facsimile standards where it is intuitive that the value of joining a network depends on the number of other consumers who join by adopting the same, or a compatible, technology. When the network effect is indirect, consumption benefits do not depend directly on the size of the network (the total number of consumers who purchase compatible products) per se. Rather individuals care about the decisions of others because of the effect that has on the incentive for the provision of complementary products. For example, PC users are better off the greater the number of consumers who purchase PCs as this would stimulate demand for compatible software, which if matched by an appropriate supply response—entry by software firms—will lead to lower prices and/or a greater variety of software. In this example there is also a positive externality on members of the same group but only "indirectly" through the "inter-group" externality.

⁵ As pointed out by Roson (2005) the nature of two-sided network externalities is determined by the characteristics of interaction processes. From the demand point of view, two main sources of externality can be singled out, depending on the interaction type:

- Single interaction externality. A single matching is realized between two entities, acting on the two market sides. Network externalities exist whenever the matching quality improves when more alternatives become available. Examples of these markets can be found in real estate, dating and employment agencies.
- Multiple interaction externality. Every agent gets a benefit, possibly potential from each interaction. More interactions are possible if more partners are available. Markets of this kind can be found in telephone directories, Internet search engines and payment systems.

buyer, would then be passed through, and neutralized, for example through a corresponding price reduction⁶.

18. Furthermore the strength of the inter-group network externalities is likely to have an influence on the pricing pattern across both sides of the market. Suppose there are two groups of agents that interact via one or more “platforms”. If a member of group 1 exerts a large positive externality on each member of group 2 then it is natural to expect that group 1 will be targeted aggressively (i.e. offered a low price relative to the cost of supply) by platforms (see also the next section)

19. In general terms, unless they act to drive the industry to monopoly, cross-group network externalities act to intensify competition and reduce platform profits. In order to be able to compete effectively on one side of the market a platform needs to perform well on the other side (and vice versa). This creates a downward pressure on both sides compared to the case where no cross-group effects exist. This implies that platforms may seek ways to mitigate networks effect, for example through platform differentiation.

20. Finally, as in all markets with network externalities, there is often the possibility that one platform will corner (both sides of) the market if the inter-group network externalities are powerful. It can be very hard for an entrant in such markets to get started. However, this outcome is not necessarily bad from a social welfare point of view when externalities are strong.

2.2 *Pricing in a two-sided platform*

21. In two-sided networks, users on each side typically require very different functionality from their common platform. Given these different requirements, platform providers may specialize in serving users on just one side of a two-sided platform. Nonetheless, whether a platform is trying to achieve a dominant position on one or both sides of the market, or competing against several others, it faces the problem of attracting both sides of the market simultaneously.

2.2.1 *Pricing instruments*

22. Rochet and Tirole’s (2004) argue that the defining feature of two-sided platforms is that there are different ways of breaking up prices across buyers and sellers, and how prices are set is not neutral. For example, newspapers sell papers to consumers at less than the marginal production cost and make money on advertisers, and eBay devotes a part of its revenue stream to providing services to large sellers. However, the ability to balance prices across the two-sides of a platform depends also on the range of pricing options available to the platform owners:

- Platforms might charge for their services on a ‘lump-sum’ basis . That is, an agent’s tariff does not explicitly depend on how well the platform performs on the other side of the market. One example is Windows OS, which is generally sold at a posted price.
- Alternatively, it may be technologically feasible to set the tariff as a function of the platform’s performance on the other side. One example of this practice is a TV channel or a newspaper that

⁶ According to the definition proposed by Rochet and Tirole (2004), such a platform should not be termed “two-sided”. More precisely, they define a platform as two-sided if, holding constant the total of prices faced by the two parties, any change in the price structure (or distribution) would affect participation levels and the number of interactions on the platform. This would occur if costs on any side cannot be completely passed through to the other side. Thus, it would become important to consider who pays what, in order to get “both sides on board”.

makes its advertising charge an increasing function of the audience or readership it obtains (to do this there must be a credible third party which can accurately estimate audiences).

- In some cases the platform owner may be able to charge for actual interactions or even sign credible contingent contracts making payments dependent on subsequent participation and transaction levels. Complicated contracts obviously have the potential to extract consumer surplus more fully, but in some circumstances could also make a dominant firm much more susceptible to entry and thus greatly limit profits. For instance, a potential intermediary could attract all buyers by promising to make large payments to them if it fails also to attract all sellers away from the incumbent intermediary. Important examples of this are credit and debit cards (where the charge paid by retailers is levied as a percentage of the revenue transacted) or telephony (where the relevant charges are levied on per-minute basis). Also, the bulk of a real estate agent 's fees are only levied in the event of a sale.

23. The crucial difference between these pricing instruments is that inter-group network externalities are less important with per-transaction charges. Since a fraction of the benefit of interacting with an extra agent on the other side is eroded by the extra charge incurred. For instance, when the charge for placing an advert in a newspaper is levied on a per-reader basis, an advertiser does not have to form a view about how many readers the newspaper will attract when it decides whether to place an advert. It will place an advert when its perceived benefit -which is most naturally considered to be expressed on a per-reader basis exceeds the per-reader charge, and this calculation does not depend upon the total number of readers. Because network effects are lessened when advertisers pay charges on a per-reader basis it is plausible that platform profits are higher when this form of charging is used.

24. At the same time charging on a per-transaction basis may be an excellent entry strategy for a competing platform. If an agent has to pay a new platform only in the event of a successful interaction, then that agent does not need to worry about how well the new platform will do in its dealings with the other side. That is to say, to attract one side of the market the new platform does not first have to get the other side "on board".

2.2.2 *Pricing structure across customer groups*

25. It is often observed that in two-sided platforms the price structure to get both sides on board and optimise usage of the platform is usually asymmetric with prices on one side substantially above those on the other side. Moreover, different firms choose different beneficiaries. In streaming video, portable documents, and advertising, for example, the industry norm is to subsidize content consumers and charge content developers. The opposite, however, holds true for operating systems and multiplayer games in which content developers receive subsidies and consumers pay to join the network.

26. Parker & Aylstine (2000) show that the pricing structure depends on cross-price elasticities as well as the relative sizes of the two-sided network effects. The intuition is that the existence of indirect inter-group network effects implies that in order to attract one group of users, the platform owner may subsidize the other group of users. Demand curves are not fixed: with positive cross-side network effects, demand curves shift outward in response to growth in the user base on the network's other side⁷. A platform owner serving two sides of the platform can set prices more efficiently by internalizing these two-sided inter-group externalities. Independent firms serving either market separately lose this advantage. Historically, for example, Adobe's portable document format (PDF) did not succeed until Adobe priced the PDF reader at zero, substantially increasing sales of PDF writers.

⁷ See "http://en.wikipedia.org/wiki/Two-sided_market" for a graphical illustration of this effect.

27. Stimulating value adding innovations is another reason to subsidize adoption. Relative to Apple computer's initial pricing, Microsoft gave away software development kits and charged no royalties to applications developers leading to more rapid development of applications for MS Windows. Instead, Microsoft made its profits by charging end-users prices well above costs. This pricing strategy is sometimes referred to as "divide-and-conquer": subsidizing the participation of one side (divide), generally the more price sensitive side, and recovering the loss on the side whose demand increased more strongly in response to growth on the other side (conquer)⁸.

28. Thus, irrespective of the pricing instrument considered, the economic literature suggests that the optimal pricing structure for a two-sided platform depends on the following factors:

- The price elasticities of demand on each side of the platform. The side that values the platform more will pay more.
- The relative strength and characteristics of the indirect network effect between the two sides.
- The level of competition from other platforms and substitute products on both sides. These include the extent of multi-homing and product differentiation (see next section).

29. Note that, pricing strategies by platform owners are not necessarily designed to recover the operating costs of one side or the other but are set to maximise profits by getting both sides on board and optimising usage of the platform. As a result the two sides of the platform prices may not reflect costs on either side. Many platforms price below the marginal cost of providing the platform on one side and substantially above total cost on the other side. Consequently, profit maximising principles in single-sided platforms of setting marginal revenue to marginal cost on each side of the platform will not generally result in optimal prices for a platform owner. More generally, the relationship between the prices and costs on both sides are interdependent and complex and the simple formulae of single-sided markets do not apply⁹.

⁸ Rochet and Tirole (2004) note that demand creation - as distinct from surplus division - violates the Coase theorem (1960). This theorem states that, regardless of externalities, transactions volume will be efficient as long as property rights are clearly defined and there are no information asymmetries or transaction costs. Buyers and sellers will bargain their way to efficiency; pollution trading rights come to mind as an example. The Coase theorem fails in the case of two-sided network effects. Property rights, symmetric information, and zero-cost transactions do not suffice for efficient trading volume when it is the presence of one consumer type that itself creates value for the other type.

⁹ Parker and Alystine (2000) introduce a simple two-sided platform model that captures the above insights. In particular they prove several simple and intuitive results. First, a firm can rationally invest in a product it intends to give away into perpetuity even in the absence of competition. The reason is that increased demand in a complementary premium goods market more than covers the cost of investment in the free-goods market. In this case, market complementarity arises from an inter-network externality. This strategy also takes advantage of information's near zero marginal cost property as it allows a firm to subsidize an arbitrarily large market at a modest fixed cost.

Second, they identify distinct markets for agents on one side (content providers) and agents on the other (end consumers) and showed that either market can be a candidate for discounting or free distribution. Deciding which market to subsidize depends on the relative network externality benefits. At a high level of externality benefit, the market that contributes more to demand for its complement is the market to provide with a free good. At lower levels, firms may charge positive prices in both markets but keep one price artificially low.

Third, they argue that, in the context of their model, consumer welfare is not harmed when firms set prices across markets with positive complementarities. Firms can manipulate total market size through choice of price in each market. Consumers then benefit to the extent that a self-interested firm sets prices more

2.3 Adhesion pattern (*Multi-homing vs. single-homing*)

30. Whenever there are several providers of the same type of platform, customers on each side of the platform may choose to subscribe to one provider only ("*single-homing*") or to several providers ("*multi-homing*")¹⁰. The concept of multi-homing covers both subscribers to all available platform providers ("full" multi-homing) and to more than one (but not all) of them – partial multi-homing (clearly this distinction does not arise where there is a monopoly platform). A platform's customers also may adopt different subscription policies both within and across sides, depending on preferences and possible differentiation among providers' offers. It turns out that it can make a big difference to outcomes whether agents on either side single-home or multi-home¹¹.

31. Multi-homing can be more easily observed when fixed costs of joining a platform are low or absent. For example, if per-transaction fee is the more significant cost element for merchants, more than one credit card will likely be accepted for payment by the same business. On the contrary, if consumers pay only a fixed subscription fee, they will tend to use a single credit card, especially if credit cards offer comparable services and have similar degrees of acceptance among merchants.

32. Adding multi-homing makes the analysis of two-sided platforms considerably more complex. To keep the analysis tractable, many authors just assume, on the basis of the specific characteristics of the markets at hand, which market side multi-homes. Other authors adopt special assumptions, which allow them to know in advance which side will eventually multi-home in equilibrium. For example, most people wish to subscribe to a single mobile telephony network; many have the time to read only a single newspaper per day and many people "one-stop shopping" to visiting a variety of locations for their shopping needs. In these and similar situations it may be appropriate to assume that the pattern of adhesion is exogenous to the conduct of platform providers.

33. As explained by Rysman (2007) the presence of multi-homing on one side of competing platforms influences the degree of competition. Whether agents at both sides of a platform participate in multiple platforms or just one has important implications for market power. If one side of a market practices single-homing, then the only way for the other side to reach those agents is through their preferred platform. Thus, platforms have monopoly power over providing access to their single-homing customers for the multi-homing side. This monopoly power naturally leads to high prices being charged to the multi-homing side and typically there will be too few agents on this side being served from a social welfare point of view¹².

efficiently but cannot capture all consumer surplus from the efficiency gains. A firm internalizes the market externality but wins only a fraction of this effect.

¹⁰ Some authors also use a slightly different terminology referring to multi-homing as "non-exclusive" interaction and single-homing as "exclusive". See for example Caillaud and Jullien (2003).

¹¹ This section heavily relies on Vannini (2008)

¹² This tendency towards high prices is tempered somewhat when the single-homing side benefits from having many agents from the other side on the platform. In that case high prices to the multi-homing side will drive away that side and thus disadvantage the platform when it tries to attract the single-homing side. However, this point is never sufficient to undermine the basic result that the price charged to the multi-homing side is too high. By contrast platforms have to compete for the single-homing customers and in many cases, the monopoly profits from the multi-homing side are passed on to the single-homing side in the form of a low price (or even a zero price) for that group. In sum, the single-homing side makes an "either-or" decision when it comes to platform choice, which makes that side of the market very competitive.

34. Multi-homing prevailing on one side of the platform and single-homing on the other often results where indirect network effects are asymmetric and mostly arise on the single-homing side. This is the situation identified in the economic literature as "competitive bottlenecks", which, in its most stylised version, boils down to full multi-homing on one side and single-homing with no exceptions on the other. In this case, as soon as platform providers manage to get enough of both sides on board, platform providers will be able to "tip" the market in a way allowing them to extract rents from multi-homing users. In this way, platform providers can cover subsidisation of single-homing users willing to join the platform, for which providers have to compete fiercely. Single-homing on one side supports rent extraction on the multi-homing side.

35. Vannini (2008) recalls that this extreme homing configuration (and related rent distribution pattern) is based on a series of assumptions: (i) that there is no differentiation among different platform providers, (ii) that customer preferences on the same side of the platform are sufficiently homogeneous and (iii) that customers on the multi-homing side have no bargaining power allowing them to limit rent extraction by the platform provider. Under these assumptions theoretical models such as Armstrong's (2006) predict intense competition between platforms on the single-homing side of the market and almost non-existent competition on the multi-homing side.

36. Intuitively, to get reciprocal multi-homing, it is essential that not all agents in the other side multi-home, which may occur only when platforms are horizontally differentiated on both sides of the market. As soon as *differentiation* enters into play, in e.g. the functionalities and content provided by the platform provider, simultaneous multi-homing on both sides of the platform becomes possible in equilibrium. If, say, consumers have access to the same content no matter which platform provider is chosen, subscribing to an additional platform provider does not give access to additional content and the marginal benefit does not justify the additional subscription, unless the price is very low (or zero). However, if different platforms give access to significantly different and complementary content (or functionalities), multi-homing may arise on the consumer side of the platform even in the absence of indirect network externalities¹³.

37. As to customers' preferences, there may well be some degree of *heterogeneity* within the same group, not only among customers belonging to different groups, so that single-homing and (different degrees of) multi-homing may coexist within the same group. For instance, some large customers need to have a backup solution in the event of technical failure of the default platform provider. Therefore, heterogeneity can also be a driver of multi-homing in the absence of indirect network externalities and differentiation.

38. Last but not least, customers on the multi-homing side, for whom the platform's provider represents a gatekeeper to single-homing customers, may have some countervailing *bargaining power*. For instance, they can divert some of their traffic and circumvent the platform, thereby decreasing the total rent available for extraction by the platform provider. While remaining able to extract the same rent in relative terms, as compared to the total rent available, the platform provider will still see its rent decrease in absolute terms because of the diversion. Faced with this possibility, the platform provider may well decide to make concessions to multi-homing customers in order to limit diversion (and the related erosion of the

¹³ Rasch (2007) offers a model with differentiation also on the multi-homing side. He claims that with product differentiation partial multi-homing arises. As a result, platforms neither always charge this side a higher price nor leave it without any surplus from trade. This is intuitive as partial multi-homing implies that platforms are no longer local monopolists on the multi-homing side which results in a price reduction. However, when it comes to the relative prices on both sides, there are ambiguous effects as to whether platforms prefer multi-homing (which is equal to lowering the respective price even more in order to boost overall demand) or whether they do not (which is equal to making services more exclusive).

total rent available for extraction). This is precisely the issue arising in the Worldspan/Travelport case discussed in section 0 below).

39. As mentioned above the reason why one side chooses to "single-home" often will depend on the specific context. In other situations the choice of joining one or more platforms should be, in principle, endogenously determined within a model of platform competition. Unfortunately, introducing endogenous platform adoption can easily make the models overwhelmingly complex, and this also explains why most authors specify ex-ante the single/multi-homing structure of the markets. There are, however, a few papers which have recently addressed special cases of endogenous adhesion patten.

40. In particular, Gabszewicz and Wauthy (2004) assume agents are heterogeneous and allow for an endogenous participation in each side of the market (i.e. registering to no platform is allowed, and is observed in equilibrium). However only registration fees are allowed in this model implying that it is best viewed as representing a situation where the agents in one side of the market have access to a set of transactions whose size is endogenously determined by the number of affiliated agents in the other side. In this model, one side multi-homes, whereas the other one single-homes¹⁴. This equilibrium has similar features as identified by Armstrong (2004) with the multi-homing side being "exploited" and the other being targeted "aggressively". A key-difference is that Armstrong assumes the homing structure (single-homing on one side, multi-homing in the other) whereas in Gabszewicz and Wauthy (2004) the unique equilibrium outcome emerges endogenously.

3. Assessment of competition cases involving two-sided platforms

41. In principle, competition concerns are the same whether firms compete in two-sided platforms, multi-sided or single-sided markets. Firms supplying two-sided platforms can exercise their market power unilaterally or through coordinated action with other firms by engaging in anti-competitive practices that harm consumer welfare and economic efficiency.

42. Nevertheless, as Wright (2004) points out two-sided platforms do present some problems for competition policy. For instance, an efficient price structure may not reflect relative costs; a high price cost margin is not generally an adequate indicator of market power; a price below marginal cost may be unrelated to predation and, importantly an increase in competition may lead to a less efficient or less balanced price structure, thus harming one side of the platform more than the other¹⁵.

43. In spite of these analytical traps that may lead a competition authority to make type I or type II errors this does not imply that a hands-off or for that matter an interventionist approach is adequate, only that extra care in the analysis is required.

3.1 Market Power

44. As explained above, the platform operator sets the price to each side in a manner that reflects the indirect network effects. It is often argued that market power such as the ability to raise prices above competitive levels is more constrained than in single-sided market, other factors remaining the same,

¹⁴ There cannot be reciprocal multi-homing in equilibrium. As mentioned above, the intuition is simple: there is no scope to multi-home when agents of the other side are already present in all platforms.

¹⁵ A further dimension of the problem is that the conventional tools of assessment used by competition authorities such as the SSNIP test and critical loss analysis for defining relevant markets and the methodologies for assessing market power need to be modified to take into account the interdependence of demand and indirect network effects that exist in two-sided platforms.

because of this interdependence of demand on both sides of the platform¹⁶. A rise in price on one side of the market will not only reduce sales on that side but may lead to a fall in demand on the other side arising from the indirect network effect. A fall in demand by customers on one side will reduce the value of participation in the platform on the other side. In turn the fall on the other side will trigger a further fall in demand on the side experiencing the price increase. The feedback effects could lead to a substantial fall in total demand for the platform that could make the price increase unprofitable.

45. As Ordovery (2008) suggests, however, this reasoning is incomplete and somewhat misleading. The mirror argument is also correct: by charging a low price on one side of the platform the platform owner attracts more agents to that side, thus improving the attractiveness of the platform for the other side and reducing the elasticity of demand. As a result, at least in principle, a low price on one side of the market lessens the adverse effects of a price increase to the participants on that side. Further, depending on the factors discussed in the previous section a platform operator may exploit the relative adhesion pattern, charging a higher price to the multi-homing side and a lower price to the single-homing side¹⁷.

46. A second constraint often alleged to exist on market power for two-sided platforms is the need for it to be acquired and maintained on both sides of the market in order to achieve profits substantially above competitive levels. Having market power one side is not enough. If there is limited competition on side A of a market but strong competition on side B, the profits earned on side A will be competed away over time on side B.

47. But note this reasoning also implies that entry might be difficult. First, because both sides of the market are needed for the product or service to function (i.e., the provider must get both sides of the market on board), new entrants face a form of the chicken-and-egg problem. This problem is probably fairly easy to overcome in some two-sided platforms, but quite difficult in others. For example, a new payment network likely would find it considerably more difficult to obtain the required critical mass of both issuers and merchants.

48. The difficulty of entry is further increased in some two-sided platforms because of the presence of particularly strong inter-group network effects. Not only must the new entrant simultaneously convince both sets of customers to purchase its product, but it must also overcome the challenge that for many customers the value of purchasing the product or service from the established provider is likely significantly greater than from purchasing from the start-up.

49. The analysis, however, is even more complex than it appears at first. As Parker and Alystine (2000) point out an incumbent firm on one side of the platform, say a content producer for one format probably does not welcome entry by a competing firm producing similar content. Buyers in the other side of the platform, however, welcome entry because it increases the prospect of a viable format should the incumbent fail. It also increases variety while possibly lowering prices. This increases both the value to

¹⁶ See, for example, Evans and Schmalensee, 2007.

¹⁷ An important complication for the analysis of market power in two sided platforms is its measurement. For example, the frequently used Lerner index, which calculates a firm's price cost margin, is not a sound measure of the extent of market power in two-sided platforms. Prices on one side of the market are not related to costs on that side but on the relative price elasticities of demand on either side, the strength of the indirect network effect and the total cost of the platform. As mentioned above, this asymmetrical price structure can result in prices being below marginal cost on one side and substantially above marginal cost on the other side. Consequently, a comparison of price to cost on either side in isolation is not an indication of market power. Formulae similar to the standard Lerner index taking into account both sides of the market have been developed (see, for example, Rochet and Tirole, 2004), though these formula lack general applicability.

individuals and the number of individuals willing to switch formats. This may lead to an expansion of the consumer side of the platform. Hence own-market entry may expand participation on the other side of each transaction. Content creators may not object to other content-providing firms if effective consumer demand rises instead of falls.

50. In sum, the implication from the literature is not that two-sided platforms cannot have market power but, rather, that a great deal of caution has to be exercised in inferring such market power from standard indicia of market power.

51. Regarding market definition the application of the SSNIP many authors have pointed out that it cannot be usefully applied to one side of the platform in isolation. For a two-sided platform, an increase in the price on one side has implications for demand on the other side and thus for the overall profitability of the platform and impact of the price increase itself. A SSNIP test based on one side of the platform alone will not capture the effects of the constraints on a price increase from the interdependence of demand on both sides and can lead to a market being too narrowly defined. A similar problem applies to the application of critical loss analysis (CLA) which is often used in conjunction with the SSNIP test. However, as Ordober (2007) again explains, this is not an unfamiliar complication: in the presence of complementary components a hypothetical monopolist must consider how a price increase on one component may lower demand, and revenues in the market for its complement. Of course it is somewhat more complicated when the link depends on inter-group network effects since generally the hypothetical two-sided platform must not only find the optimal price level but also the optimal price structure. However, these problems are not insurmountable and (certainly as a guiding concept) both the SSNIP test and CLA can still be applied with modifications.

3.2 *Cross-market welfare effects*

52. The characteristics of two-sided platforms increase the difficulty of analyzing the competitive effects of mergers and other conduct. For example, a merger of exchange or intermediation platforms may slightly reduce competition among vendors on one side of the market, but produce substantial pro-competitive gains from efficiencies for the customers on the other side of the market. Deciding how to balance these offsetting effects is not easy.

53. However both the merger guidelines as well as the guidelines on Article 81(3) leave open the possibility of taking cross market efficiencies into consideration in assessing the overall competitive effects of a merger or agreement. Paragraph 79 of the Horizontal Merger Guidelines states that “*The relevant benchmark in assessing efficiency claims is that consumers will not be worse off as a result of the merger. For that purpose, efficiencies should be substantial and timely, and should, in principle, benefit consumers in those relevant markets where it is otherwise likely that competition concerns would occur*”. Note that the wording clearly suggests that in some (possibly exceptional) circumstances the Commission would take into account efficiencies that benefit one set of consumers as partially offsetting harm to another group. Two-sided platforms may indeed be one of such circumstances.

54. The guidelines on Article 81.3 contain similar wording in paragraph 43: “The assessment under Article 81(3) of benefits flowing from restrictive agreements is in principle made within the confines of each relevant market to which the agreement relates”. However, this paragraph further specifies that “where two markets are related, efficiencies achieved on separate markets can be taken into account provided that the group of consumers affected by the restriction and benefiting from the efficiency gains are substantially the same”. In the case of two-sided platforms, it is clear that the two sides are related. However, agents on each side are in general not substantially the same. Still, benefits on one side of the platform may lead, through the inter-group network effects to compensating benefits to agents on the other side.

55. It also worth pointing out that, as mentioned in footnote 57 "...the Court of First Instance held that Article 81(3) does not require that the benefits are linked to a specific market and that in appropriate cases regard must be had to benefits 'for every other market on which the agreement in question might have beneficial effects, and even, in a more general sense, for any service the quality or efficiency of which might be improved by the existence of that agreement'. However, in the same footnote it is also indicated that in the case in question in fact the customers in both related markets were substantially the same.

3.3 *The limits of competition policy*

56. In the model proposed by Armstrong (2006) and discussed in section 0 platforms exploit their monopoly position on the multi-homing side by setting high charges to that group. How high these charges are depends on how much the single-homing group cares about the volume of business on the multi-homing side. The profits from the multi-homing side are used to fund aggressive marketing efforts towards the single-homing side.

57. Armstrong points out that even if the platforms do not make excessive profits overall, the multi-homing side faces too high a charge from the point of view of social welfare. Bolt and Tieman (2006) in a comparatively simple two-sided platform model, obtain a similar result. They show that in the social optimum, platform pricing leads to an inherent cost recovery problem. This result is driven by the inter-group network effect of participation that users on either side of the market exert on the opposite side. The contribution of this positive externality to social welfare leads the social planner to choose a corner solution, in terms of full participation of the more elastic buyers' side of the market and recovering costs from the price-inelastic sellers' side. In fact a social planner will price below marginal costs, leading to an under-recovery of costs and hence an operational loss for the platform. The positive network externalities operate like economies of scale on demand, analogous to the case of a natural monopoly. It follows that even adequate competition policy enforcement alone may not always lead to best outcomes. This suggests, at least in some instances regulation may be pertinent.

58. In particular, since the platform network generates positive social welfare, compensation through external subsidies from the social planner or cross-subsidization from other sources of income could be warranted. As Bolt and Tieman (2006) also point out, however, in a dynamic perspective, subsidies may enhance the rapid development of more advanced networks, but could stifle innovative potential if they induce monopoly platforms to remain idle and "have a quiet life". Another possibility would be to facilitate the use of more complex pricing mechanism such as two-part tariffs. Alternatively, the social planner might instruct the platform to implement Ramsey pricing, that is, to set prices that optimize social welfare under a balanced budget constraint. However, these types of solutions have second-best distortionary side effects, which should be taken into account.

3.4 *Anti-competitive foreclosure in two-sided platforms*

59. Typically, large two sided platforms, especially in the "new economy" display substantial economies of scale arising from large fixed costs in developing and maintaining a platform and relatively low marginal costs in serving both sets of customers. Where substantial economies of scale exist, the typical market structure is likely to consist of a few large firms each with significant market power. Strong network effects reinforce the trend towards a concentrated market structure. Platforms with more customers on one side are more valuable to customers on the other side and become more valuable as the demand from each side grows. In a platform with large economies of scale, unit costs fall as demand grows and profit margins increase. In these market circumstances, firms that are first or early movers have a natural advantage, which combined with economies of scale, means that competition in some two-sided platforms can be a race for the market. Moreover it is worth noting that two-sided platforms can tip easily. Buyers will tend to prefer (all other things equal) the platform that offers access to the most sellers, and

sellers will tend to prefer the platform that offers access to the most buyers. Such network effects can tip the market towards being served by just one or two platforms. There is a risk that the asymmetric pricing structure described above could further increase the likelihood of such tipping occurring.

60. In this context, successful market foreclosure resulting from the conduct of a dominant incumbent platform, a merger or an agreement may have serious anti-competitive effects without hope that the market will self-correct within a reasonable period. Indeed it is useful to recall that the recent Guidance on Article 82 explicitly recognizes many of the factors that appear critical in assessing competition in two-sided platforms. In particular, paragraph 20 emphasizes the conditions on the relevant market for this assessment “...*this includes the conditions of entry and expansion, such as the existence of economies of scale and/or scope and network effects. Economies of scale mean that competitors are less likely to enter or stay in the market if the dominant undertaking forecloses a significant part of the relevant market. Similarly, the conduct may allow the dominant undertaking to "tip" a market characterised by network effects in its favour or to further entrench its position on such a market.*”

61. Notwithstanding the above, as Evans and Schmalensee (2005) argue, although economies of scale may exist for a wide range of output they eventually can be exhausted and diseconomies of scale in the form of rising average costs will appear on one or both sides of the market, limiting the size of individual platforms. For example, marginal costs can increase as a platform becomes more complex when it expands in size or grows in functionality and features. Software programs are an example. Further, congestion costs can increase, reducing the appeal of a platform as it grows in size and complexity¹⁸. A further constraint is product differentiation. There is often considerable scope for vertical differentiation where platforms can compete in different levels of product quality or service. Shopping malls may be upmarket or downmarket as can nightclubs and dating clubs. Alternatively, platforms can compete through horizontal differentiation by appealing to different tastes and preferences among customers. Also intra-group (negative) externalities might constraint the size of a network. Consumers, when subscribing, might not only take into account the size of the other side but also the probability to reach a match with a consumer of the other side. Thus the more the people he faces on the side he belongs the less the probability to reach a match. Thus a customer might prefer to join a less crowded platform and overall the size of a platform might be capped.

62. The sub-sections that follow consider the competitive effects of certain practices in the context of two-sided platform competition.

3.4.1 *Predatory pricing*

63. In two-sided platforms, the price charged to one side by a platform may be below marginal or average variable cost. Empirical research also confirms that below-cost pricing is relatively common in two-sided platforms. Even under pure Bertrand competition prices are not, in general, aligned to costs, despite the fact that profits are may be completely competed away. As explained in section 0 given the need to have both sides on board, a price set above marginal or average costs is not a symptom of market power, and setting a price below marginal cost or even at or below zero can be a profitable strategy by a platform to maximize participation by one side of the market, which will generate higher total consumer welfare by increasing participation on the other side. Moreover, a skewed pricing structure may not reflect

¹⁸ Congestion constraints can be physical and on both sides of the market such as in shopping malls and nightclubs. Other congestion costs can be on one side only. For example, as the number of adverts appears in a newspaper or magazine they may crowd each other out reducing the effectiveness of each advert. Negative indirect network effects can also emerge as a platform expands on one side. A magazine having too high a proportion of adverts to content may find that some readers become increasingly averse to them and no longer buy, leading to a fall in circulation.

anti-competitive cross subsidies (see Wright, 2003). It is therefore important to assess carefully a possible defense by a platform owner that its price structure of below cost pricing on one side does generate pro-competitive gains to customers on both sides of the market.

64. The Article 82 Guidance Paper explicitly recognized this possibility in footnote 19: "In order to apply these cost benchmarks it may also be necessary to look at revenues and costs of the dominant company and its competitors in a wider context. It may not be sufficient to only assess whether the price or revenue covers the costs for the product in question, but it may be necessary to look at incremental revenues in case the dominant company's conduct in question negatively affects its revenues in other markets or of other products. Similarly, in the case of two sided markets it may be necessary to look at revenues and costs of both sides at the same time".

65. It would be incorrect to assume, however, that predatory pricing by two-sided platforms can be ruled out. It can occur when prices on both sides of the market are set by a firm at a level that is insufficient to cover the total variable costs of the platform. In these circumstances, a competing platform may become unprofitable irrespective of how it structures its prices and will exit the market, allowing the predatory firm to raise its prices on both sides and earn economic profits sufficient to more than recoup its earlier losses. In this case the analysis might still focus on a comparison of incremental revenues versus incremental costs defined over packages of goods or services that serve the interests of customers on both sides of the platform. In no case, however, can a two-sided platform expect immunity from a claim of predation.

66. Moreover, as Fletcher (2008) recently pointed out a dominant platform may predate through asymmetric pricing between the two sides of the market. The issue is whether a given pricing structure can affect market structure, and specifically whether low pricing on one side of a market can prevent entry into both sides. As Fletcher argues, this is unlikely to be a feasible exclusion strategy where firms are entirely symmetric. In such a situation, if one firm can gain incremental revenues on one side of a market when it wins extra business on the other side, and prices accordingly, then the same opportunities and pricing incentives will apply to its competitors. However, assume competitors of the dominant platform have limited ability to turn extra business on one side of the market into incremental revenues on the other. Such firms could find it hard to compete against a very asymmetric pricing structure, and therefore may be excluded from both sides of the market.

3.4.2 Influencing adoption strategies (use of exclusivity agreements)

67. Cross-market effects are often used to explain the anti-competitive effects of exclusive dealing in a vertical context. (See Bernheim and Whinston (1998), for instance) Such cross-market effects naturally arise in two-sided platforms. When agents on one side of the market multihome, platforms might offer exclusive contracts to them to prevent them from multi-homing, thereby profiting from the increased demand from agents on the other side. Such exclusive contracts can be "cheap" to offer, since by tying up one side of the platform (say sellers), the platform attracts the other side (buyers), which reinforces the decision of sellers to sign up exclusively.

68. There are several examples where platforms attempt to persuade agents on one side of the market to join one platform or the other exclusively (i.e. to single-home). For instance, a broadcaster will pay a premium to obtain attractive content (sports rights, movies, and so on) for its sole use. In a framework where one side of the market single-homes while the other multi-homes there is a unilateral incentive for a platform to obtain agents on the multi-homing side exclusively. The reason is that such a policy makes the rival platforms service to the single-homing agents less attractive, and hence allows the platform to obtain more profits from the single-homing side. This strongly suggests that a platform will be prepared to pay more (or charge less) for exclusive access to the (ordinarily) multi-homing side.

69. On its own, this is not enough to make the multi-homing agents agree to these exclusive terms: after all they might make more money from dealing non-exclusively with all platforms than from dealing exclusively with one platform. However, it is possible to construct models where agents who would otherwise multi-home find it in their interest to deal exclusively with a single platform. That said, it is also possible that the ability to secure exclusive deals with the multi-homing group will actually make the platforms worse off (but the multi-homing group would be made better off), since cross-group network externalities become more significant.

70. Caillaud and Jullien (2003) focus on two-sided platforms with a particular emphasis on relevant features of the intermediation activity on the Internet. Intermediation services usually are not exclusive, and users often rely heavily on the services of several intermediation providers. Thus they consider a case where agents who make use of the platforms are homogeneous and all agents on both sides of the market "participate" (i.e. register to one platform at least). Further, they allow for flexible pricing strategies: platforms may jointly charge registration fees (applying *ex ante*) and transaction fees (applying *ex post*). This flexibility induces more competition between platforms and a rich set of strategy profiles. This model fits the issue of matching two types of agents to form partnerships, as for example happens in the case of e-commerce. They offer some surprising results that run counter to intuition built on conventional "single-sided" markets. In particular they show that consumer welfare is higher under exclusive services than in any equilibrium with nonexclusive services, even though assuming undifferentiated but exclusive platforms, competition yields an equilibrium with a market structure that involves monopolization. This is because under exclusive services, the market is highly contestable with low (vanishing) profits. Non-exclusivity, however, induces a less severe degree of competition and allows positive profits in any type of equilibrium. In fact, intermediation platforms have an incentive to open up the intermediation market so as to allow users to turn to several intermediaries simultaneously: this moderates price competition and reinforces market power and intermediation profits.

71. Caillaud and Jullien (2003) argue that competition policy must be designed with care when the circumstances they model apply (primarily in intermediation markets such as the internet). First, concentration may not necessarily carry strong inefficiencies; in fact, the opposite may be true. Intermediation profits may be larger in market-sharing configurations, and the users' surplus may have better protection in concentrated markets where one large intermediary dominates, provided that there is enough contestability. Second, exclusivity actually exacerbates competition between intermediation service providers and forces profits down to zero, while non exclusivity allows a whole range of strictly profitable equilibria. So, in equilibrium, platforms would choose to allow for multiple registration.

72. However, alternative modeling assumptions can lead to different (and opposite) results. Armstrong and Wright (2004) consider the possible existence of strategies specifically designed to influence adoption choice, which they refer to as exclusive deals. They first derive conditions under which, in a certain two-sided platform, single-side multi-homes and the other one single-homes. They show that in the case where product differentiation arises only on one side of the market (say, the buyers), an equilibrium exists where agents on the other side (the sellers) will multihome. This case represents a "competitive bottleneck". A similar outcome can arise when there is no product differentiation on either side.

73. The authors then consider the possibility that a platform proposes to the agents of the multi-homing side a "discounted" price, contingent on exclusivity (single-homing on that platform). Exclusive contracts work by making it easier for a platform to unsettle an equilibrium with multi-homing on one side. With exclusive contracts, however, a platform can set arbitrarily high nonexclusive prices (so that sellers never choose to multi-home regardless of the rival platform's offer) and then offer a slight price cut relative to the rival platform to attract all sellers exclusively. The resulting positive network effect can then

be exploited on the buyer side. When network effects are strong, this can lead to an equilibrium where all agents sign up exclusively to a single platform even though it sets high prices to both sides.

74. Where platforms can set negative prices (pay bribes), exclusive deals allow the dominant platform to raise prices and profits by making it more expensive for the rival platform to employ a “divide-and-conquer” strategy. A complete characterization of equilibria with exclusive deals, however, proves to be difficult: depending on model parameters and selection criteria. There can be equilibria with both platforms active, or only one, and with or without exclusive contracts.

75. Nonetheless, the model offers differing predictions for the social desirability of exclusive contracts depending on the extent of product differentiation on the buyer side. With strong product differentiation on the buyer side, exclusive contracts result in all sellers joining a single platform, but some buyers sticking to their preferred platform. Not only does this result in lower network benefits (for those buyers loyal to the excluded platform), but it also results in higher transaction costs for those buyers that do not stick to their preferred platform. They authors show that under the assumptions of the model, the added transaction costs and reduced network benefits exceed the cost savings to sellers, who no longer subscribe to both platforms. Exclusive contracts are thus inefficient. In contrast, with pure network effects exclusive contracts are efficient, since they eliminate the duplication of costs that arises under seller multi-homing, and result in maximal network benefits given buyers and sellers all subscribe to a single platform.

3.4.3 *Tying*

76. Formal economic analysis of tying that explicitly accounts for the peculiarities of two-sided platforms is scarce¹⁹. However, recently a few researchers have proposed theoretical papers addressing the use of tying in the context of two-sided platforms.

77. Rochet and Tirole (2003) provide an economic analysis of the tying practice initiated by payments card associations Visa and MasterCard in which merchants who accept their credit cards were forced also to accept their debit cards. This tie-in practice, the so-called “honor-all-cards” rule, has been challenged recently by major merchants including Walmart in a class action suit. In the class action suit on behalf of thousands of retailers, the stores argued that Visa and MasterCard unfairly required merchants to accept their debit cards, which require a customer's signature to verify a transaction, to exclude PIN-based on-line debit cards. They show that in the absence of tying, the interchange fee between the merchant's and the cardholder's banks on debit is too low and tends to be too high on credit compared to the social optimum. Tying is shown to be a mechanism to rebalance the interchange fee structure and raise social welfare.

78. Choi (2007), develops a preliminary model inspired by the EU Microsoft case where it was alleged that the company's tying practice of requiring Windows operating system users to accept its Windows Media Player software led to anticompetitive foreclosure. In the case of streaming media software, content providers and consumers constitute the two sides of the platform.

79. In Choi's model, there are two intermediaries competing for market share within each group. There is free entry in the market for content provision. Content providers are heterogeneous in their fixed cost of creating content which need to be incurred twice if they multi-home, i.e., make their contents available in digital form on both platforms. The choice of consumers' platform is analyzed by adopting the Hotelling model of product differentiation in which the two platforms are located at the two extreme points of a line. Consumers are uniformly distributed along the line and each consumer's utility of participating in a platform depends on the number of content providers on the same platform.

¹⁹ A few exceptions are Rochet and Tirole (2003), Choi (2004) and Amelio and Jullien (2008)

80. Choi compares the market outcomes under tying and no tying and provide a welfare analysis. There are three channels through which tying can affect social welfare due to the monopolization of both sides of the market. First, all consumers patronize the tying firm's platform. This implies that there is less variety in the market. As a result, there are less desirable matches between the consumers and platforms, leading to higher overall "transportation costs" (or transaction costs) Second, content is provided only on the tying firm's platform, whereas the same content was produced on both platforms in the absence of tying. Thus, there are savings in duplication costs under tying. Third, the number of entrants in the content side of the market that determines the availability of content can differ across regimes. The first effect is negative while the second effect is positive. The sign of the third effect is ambiguous. The coordination of consumers on the tying firm's platform enhances the incentive to enter the content side of the market. However, the tying firm's pricing decision in that side of the market can offset this positive effect. The preliminary result suggests that the welfare implications of tying depend on the relative magnitude of inter-group externalities and the extent of product differentiation. If the extent of inter-group externalities is significant compared to that of product differentiation, tying can be welfare-enhancing since the benefit from internalizing the inter-group network externalities outweighs the loss of product variety. Otherwise, tying reduces welfare.

81. Tying can be a very effective mechanism through which a dominant firm in a related market can penetrate one side of the two-sided platform to gain an advantage in competition for the other side. Both Rochet and Tirole (2003) and Choi (2004), however, are tailored to analyze specific cases of the payment card and media software industries, respectively. It would be desirable to develop a unified and more general framework that can encompass a variety of two-sided platform situations.

82. A first step in this direction is Amelio and Jullien (2007). They consider a setting in which two-sided platforms would like to set prices below zero on one side of the market in order to solve the demand coordination problem, but are constrained to set non-negative prices. Tying can then serve as a mechanism to introduce implicit subsidies on one side of the market in order to solve the aforementioned coordination failure. As a result, tying can raise participation on both sides and can benefit consumers in the case of monopoly platform. In a duopoly context tying also has a strategic effect on competition. Contrary to the monopoly case, tying may not be ex-post and/or ex-ante optimal for a contested platform. Moreover, the competing platform benefits from it if the equilibrium implicit subsidy is large enough.

83. Finally, Fahri and Hagiu (2008) consider a two-sided platform A and a dominant firm that has a monopoly power over another product M which is homogenously valued by all customers on one side of A. Similarly to Whinston (1990) tying M and the purchase of the platform on this side of A then acts as a commitment to price aggressively by raising the opportunity cost of a foregone sale. In the pricing game that follows, it has the same effect as a reduction of the marginal cost of distribution of A on the side of the market, which buys M, relative to rival two-sided platforms. In a single-sided market with price competition and homogenous valuations of the tying good, tying is always a "top dog" strategy: it decreases rivals' profits while increasing one's own. By contrast, the result mentioned above implies that in a two-sided platform, tying can be part of a "fat cat" strategy: a profitable way to accommodate entry while at the same time being "soft" (i.e. benefitting rivals as well).

4. Significance of two-sided platforms in selected merger cases

84. The two- (or multi-) sided nature of a market should explicitly be considered in the evaluation of the existence and magnitude of possible anti-competitive effects. In particular if two platforms merger, the presence of the two sides must be considered. In general terms, competition policy accepts or refuses the merger in view of the evolution of prices. However, the price structure across both sides of the platform must be considered in two-sided platforms. Indeed a price increase on one side can reflect a decrease on the other in order to preserve balanced demand. So a price decrease on one side increases willingness to

pay on the other side. In the end the variation in the total price may be low, although the price structure has changed significantly.

85. For instance, a merger analysis which concludes that a merger between platforms has no detrimental effect on competition simply because consumers in one side of the platform continue to be charged nothing would be incorrect. With buyers paying nothing, reduced competition for buyers may not increase prices for buyers, but it may increase prices for sellers instead. Similarly, an empirical analysis that tries to explain prices to sellers should include cost and product characteristics from the buyers' side even if buyers are charged nothing. For example, differences in the costs of distributing Yellow Pages to readers, or in the extent of differentiation between directories from the readers' perspective may help explain variations in how much directories charge advertisers across different markets. (See Rysman (2004) for an empirical analysis of the Yellow Pages markets.)

4.1 Google-DoubleClick²⁰

86. Many of the specific issues raised by two-sided platform competition and mentioned in previous sections have been identified and taken into consideration in a number of recent merger cases.

87. The *Google/DoubleClick* merger²¹ generated considerable interest as it concerned the ubiquitous search engine that most Europeans use in their daily lives. From a competition policy perspective, the case raised a number of interesting issues and, in particular, it was the first major concentration for which the Commission had to assess non-horizontal effects following its adoption of the Non-Horizontal Merger Guidelines. This case was notable in that it covered horizontal, vertical as well as conglomerate aspects.

88. During the investigation, the Commission received a significant number of complaints and a wide range of different theories of harm were put forward by competitors and, to a lesser extent, by some customers of the parties. The Commission assessed these complaints and theories of harm carefully. In doing so, it took into account that the *Google/DoubleClick* case concerned a transaction in a relatively new industry, which is constantly evolving at a fast pace and in which reliable market data are extremely difficult to obtain. Furthermore, the two-sided nature of the services offered was explicitly identified and many of the issues identified in the two-sided platform literature were considered, either implicitly or explicitly.

89. Google and DoubleClick are not direct competitors in the traditional sense. Google is a major provider of online space and intermediation services for online advertisements while DoubleClick is a leading provider of ad serving technology used to deliver ads onto websites and to produce performance metrics for these ads.

90. Intermediation services are offered by "ad networks" or "ad exchanges" and, to some extent, by "media agencies". An ad network is a two-sided platform serving:

1. publishers (websites) that want to host advertisements, and
2. advertisers that want to run ads on those sites.

91. Online publishers sell advertising space on their websites in order to generate revenues. Advertisers purchase such advertising space to place their advertisements. Once online advertising space has been sold by a publisher to an advertiser, either directly or through an intermediary, both parties need

²⁰ This section is adapted from De Coninck and Papandropoulos (2008)

²¹ Case COMP/M.4731 Google/DoubleClick.

to ensure that the correct advertisement actually appears on (i.e. is served to) the publisher's website space at the right place at the right time. This step is performed by the ad serving tools, which also measure the performance of the ad placement (by recording events and in some situations by 'tracking' the behaviour of users). DoubleClick provides such ad serving tools to both publishers and advertisers.

92. Google offers advertising space on its own website (Google.com) as well as intermediation services through its ad network AdSense. Ad networks match the supply of advertiser space offered by publishers and the demand for such space, stemming from advertisers.

93. Through its online activities, Google is mainly active in search (text) and contextual (text) ads while DoubleClick's technology is mainly used for (graphical) display ads. Display ad serving involves sophisticated reporting metrics that are generally not offered in the context of text ad serving. Given Google's focus on text ads (search and contextual), the parties claimed that one of the rationales for acquiring DoubleClick was to enable Google to accelerate the offering of display ads on its AdSense network. The second rationale given was to gain access to DoubleClick's publisher base and improve the attractiveness of the AdSense network for publishers, in particular for the inventory of publishers that currently goes unsold.

94. There are various distribution channels through which publishers and advertisers serve online ads. Publishers can either sell their online space directly to advertisers or use intermediation platforms such as AdSense. Valuable (premium) online space (e.g. the homepage of large publishers) is usually sold directly while less valuable (remnant) online space is often sold through intermediaries to maximise the monetization prospect of the space for sale. Large publishers tend to use both direct and intermediated sales while smaller publishers tend to rely on intermediated sales²².

95. In the intermediated channel, intermediation services can be bundled with ad serving (this is Google's AdSense model) or sold independently (this unbundled solution is used by ad networks such as AdLink). Hence, while the parties are not direct competitors, DoubleClick provides an input (ad serving) into distribution channels (direct and unbundled) that competes with Google's bundled AdSense offering.

96. From the point of view of publishers and advertisers, the merger could raise conglomerate issues given that Google and DoubleClick offer two products (intermediation and ad serving) that are both used for online advertising. Given that ad networks (such as AdLink) competing with Google's ad network

²² Ad networks aggregate ad space inventory thus maximizing revenue opportunities and minimizing administrative costs of selling the ad space for the publisher. From an advertiser's point of view, an ad network can be considered as a "single buying point" for online inventory which often also provides handling and performance monitoring of online advertising campaigns. Ad networks generate revenues (paid by advertisers for access to publishers' ad space inventory) that are shared between the network manager (as intermediation fees) and publishers. In the EEA, Google's AdSense, Yahoo!Publisher Network, DrivePM (belonging to the Microsoft group), TradeDoubler, Zanox, AdLink, Interactive Media, AOL, Tomorrow Focus and 24/7 (belonging to the WPP group) and a significant number of other smaller players are active as ad networks.

An ad exchange provides a marketplace where advertisers and publishers buy and sell ad space on a real-time basis. The main difference between ad exchanges and ad networks is that ad networks aggregate ad inventory from publishers, which is then re-sold by the platform manager to advertisers, whereas an ad exchange is a (virtual) marketplace where publishers and advertisers can virtually meet to find and execute transactions. Networks tend to be "closed" systems with a finite number of buyers and sellers, whereas exchanges tend to be "open" systems whereby any buyer or seller can access the platform and trade. Open ad exchanges allow both advertisers and ad networks to buy ad space. In the EEA, *inter alia* Rightmedia (belonging to the Yahoo! group), AdECN (belonging to the Microsoft group), Tomorrow Focus and Quigo are active as ad exchanges.

(AdSense) use the ad serving technology to serve the ads on their platform, the merger also had a vertical dimension given that Google was acquiring a leading provider of a major input for rival ad networks.

97. During the investigation, complainants focused on the potential for Google AdSense to become, through the merger, an unavoidable intermediation platform in the future which would marginalise its rivals on the market for intermediation. The main worry expressed by complainants (and some respondents to the market investigation) was that post-merger, Google would be able to leverage DoubleClick's leading position in ad serving to become the dominant intermediation platform for online advertising. Google would be able to engage in a number of strategies aimed at increasing the price of DoubleClick's products when used with ad networks competing with AdSense. These strategies involved mixed bundling (offering DoubleClick's products cheaper when used alongside AdSense's intermediation services), pure bundling (selling DoubleClick's products with AdSense only), manipulation/tweaking of the ad serving software to the benefit of AdSense (i.e. the arbitration logarithm would favor

98. AdSense instead of rival networks), price increases (the price of DoubleClick's products would be raised if used on competing networks) and quality degradation (e.g. the new entity would fail to develop functionalities enabling DoubleClick's products to be used efficiently on rival networks). Through these strategies, Google would attract more publishers and advertisers to AdSense, ultimately leading to a "tipping" effect that would marginalise rival networks. In the long run, Google's AdSense would become the dominant intermediation platform, able to exercise market power and increase intermediation fees.

99. The likelihood of anti-competitive effects based on these theories hinged on a number of assumptions such as (a) the degree of DoubleClick's market power (depending in particular on the extent of switching costs for ad serving¹⁰), (b) the extent to which intermediation is characterized by direct and indirect network externalities¹¹ and (c) the impact of price changes for ad serving on the choice of ad network by publishers/advertisers. The investigation focused on gathering evidence to verify whether these assumptions could be validated.

100. With respect to DoubleClick's market power, the Commission found convincing evidence putting into question DoubleClick's ability to exercise market power. This evidence covered data on the extent of switching between ad serving suppliers, on the evolution of prices for ad serving and on switching costs. In particular, a large number of ad serving contracts have relatively short durations (under 2 years) and contract terms are frequently renegotiated. Switching is also frequent. Switching data provided by the parties indicated that DoubleClick's customer churn rate was about 12.6% in 2006 and ad serving prices had considerably and consistently been declining over the last few years.

101. With respect to indirect network effects (i.e. the larger the number of publishers using a platform, the more attractive it is to advertisers and vice versa), the Commission found evidence that there had been significant entry and strong competition in online ad intermediation, evidence on the prevalence of multi-homing (i.e. customers using more than one intermediation platform) and evidence that ad networks competed even with a relatively small number of partners on the publisher side. The prevalence of multi-homing suggested that the participation by a publisher or an advertiser to an ad network (e.g. AdSense) does not imply that they are unable or unwilling to participate in another ad network; their participation to an ad network is not exclusive. The concern that AdSense would unavoidably become the dominant intermediation platform at the expense of rivals as a result of the merger therefore appeared unconvincing. Also, the market investigation did not provide support for the view that the merged entity would benefit from a direct network effect, such that the quality of the matching that it could undertake between publishers and advertisers would be affected by the scope and quality of its publisher customer base. Direct network effects might arise because of the ability to use information about users across different publishers. However, publishers and advertisers contractually prohibit DoubleClick from using their data to improve targeting to other publishers/advertisers. Moreover, it appeared that the type of

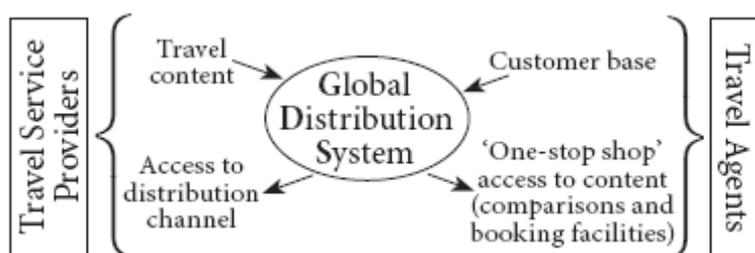
behavioural targeting that lies at the core of these direct network effects is an emerging technology which neither DoubleClick nor Google have developed, contrary to a number of competing firms (such as Yahoo!'s ad network BlueLithium or AOL's Tacoda network).

102. With respect to the cost of ad serving, the Commission found that ad serving represents a small fraction of the publisher's net profits (and the advertiser's cost of purchasing online space). The price of ad serving on competing ad networks would therefore have to increase significantly to induce the scope of switching towards AdSense that might lead to the tipping effect envisaged by complainants. This was deemed highly unlikely given the competitive constraints to which DoubleClick is subject.

103. In any event, the new entity would continue to compete with a number of vertically integrated rivals such as Microsoft, Yahoo!, AOL as well as WPP (an ad agency) and Axel Springer (a major online and offline publisher). Indeed, these companies were offering both ad serving tools and intermediation services following a number of acquisitions made after the announcement of the Google/DoubleClick transaction.

4.2 *Worldspan/Travelport*²³

104. In December 2006, the US firm Travelport, a subsidiary of the Blackstone Group (a US private equity and asset management firm), agreed to acquire Worldspan Technologies Inc. (another US company). This transaction was authorised on 21 August 2007 after a 'Phase II' investigation. Both merging parties provide travel distribution services, in particular through their respective 'global distribution systems' Worldspan and Galileo (Travelport's brand). These technical platforms match travel content provided by airlines, hotel chains, car rental services, etc. on one side, and the demand for such content as conveyed by travel agents on the other side. In what follows 'GDS' (or more simply 'the platform') refers to a global distribution system, 'airlines' to the broader category of travel content providers and 'agents' to travel agents. As summarised in Figure 1, a GDS is a platform between two distinct groups of customers, airlines and agents.



105. On the one side of the platform, airlines provide travel content (namely prices and availabilities) to be included in the GDS offer to agents. Through the platform, airlines obtain access to a distribution channel, namely the network of agents using that GDS.

106. On the other side of the platform, each agent subscribing to a GDS provides its customer base to airlines via the GDS. Through the platform, agents obtain efficient access to travel content, with facilities for price/content comparisons as well as an interface for centralised bookings from different sources.

²³ This section is adapted Vannini (2008)

107. In other words, the existence of the GDS is justified by the value it creates in terms of (i) lower transaction costs (or higher efficiency) especially for agents and (ii) positive network externalities especially for airlines.

108. Reduced transaction costs mainly benefit agents by making their searches more effective and less time-consuming, as compared to searches using a number of airline-specific sources.

109. As regards network externalities, 'indirect' (i.e. cross-group) externalities for airlines make the two-sided nature of the market relevant for its analysis. In this specific case, indirect network externalities arise from the fact that the wider the network of agent outlets (and the related end customer base) reached by airlines using a given GDS, the larger the value for airlines in using that platform.

110. The two sides of the GDS market exhibit some distinctive features. Firstly, airlines whose content is offered via GDSs tend to have a broader (pan-European or even global) coverage than agents using GDS services (only very few having a broader than national coverage) (11). Secondly, virtually all airlines subscribe to all GDS providers (12), whereas agents generally tend to use only one GDS (13)

111. It should also be stressed at this point that the GDS is only one of different channels through which travel-related content can be distributed to end-consumers. However, these different channels may have different groups of customers on their respective sides. For instance, 'supplier.coms' (i.e. booking facilities available on some individual airline websites (14)) address end-consumers instead of agents. Also, even when addressing the same customers as GDSs (i.e. agents), the functionalities provided by web-booking facilities may be limited. For instance, an agent may have a 'direct link' to the booking inventory of an airline, thereby bypassing GDS providers and the related fees, but at the cost of losing the price-comparison functionalities or of having to create in-house solutions to reproduce similar functionalities. The limited substitutability between GDS platforms and alternative channels suggests considering a narrow product market for GDS, rather than a broader market including those other distribution channels as well.

4.2.1 Multi-homing and single-homing in the GDS market

112. The two-sided GDS market contains a number of elements characteristic of the multi-homing / single-homing configuration (or 'competitive bottlenecks') described in economic literature. These elements are:

1. A limited degree of product differentiation
2. Asymmetries in indirect network effects, with indirect network externalities generated mainly if not exclusively on the agent side and GDS providers competing to attract agents in order to generate demand on the airline side;
3. A distribution of prices and revenues skewed towards one side of the platform, with GDS providers obtaining profits on the airline side and partially using those profits to offset net losses on the agent side. The number of 'reachable' agents (and the related customer base) is extremely important for airlines, because indirect network externalities generated on the agent side (e.g. in terms of booking volumes) depend on it and airlines may take advantage of this by multi-homing. For this reason virtually all airlines subscribe to all GDS providers.

113. If a sufficient number of airlines use multi-homing and all of them provide their full inventory, each GDS ends up providing a broadly similar content, which reduces (or removes altogether) the indirect network externalities generated on the airline side and the related added value for agents of subscribing to an additional GDS. Therefore, disregarding possible different functionalities made available by the GDS

provider, agents will only need to subscribe to one GDS, especially where any additional subscription would incur significant additional costs. In fact, single-homing is the prevalent configuration observed on the agent side.

114. A GDS provider must be in a position to offer a sufficiently broad network of agents (and related customer base) to airlines, and offer at least as good a content as competing GDS providers to agents, for which it will compete mainly through incentives, possibly complemented by some slight differentiation in terms of sophisticated functionalities. The asymmetry in network effects and, correspondingly, in subscription policies between the two sides of the platform explains the skewed pricing policy applied by GDS providers and the related financial flows, namely the fact that agents tend to be net receivers and airlines net payers.

115. The larger the number of agents reachable via a given GDS, the higher the positive network externalities that are generated by that GDS and, correspondingly, the higher the price the airline will be willing to pay to distribute content via that GDS.

116. But GDS providers have to compete for agents, so that they have to share with them, in the form of incentives, part of (and in extreme cases all) the rents that can be extracted from airlines.

117. Agents become net receivers as soon as the subscription fees charged to agents by the GDS provider are more than offset by incentive payments paid to them by the GDS provider. In this relatively simplified situation, airlines are clear contributors, while the GDS and agents share in some way the rents extracted from airlines. All this is driven by the limited product differentiation and by asymmetries in network effects, generating the skewed distribution of prices and related revenue flows.

4.2.2 Recent market developments

118. The situation in the GDS market has recently evolved and is no longer so clear-cut. Until now, it has been implicitly assumed that (i) the provision of content by an airline is a discrete choice, i.e. whether or not to make an airline's entire inventory available, resulting in limited differentiation between GDS interface/providers (in terms of functionalities or technical assistance, as discussed below) and (ii) GDSs are the only distribution channel available for travel-related content.

119. On the first issue, airlines do have the capability to withhold specific content and even to discriminate between GDS providers in terms of the content made available to each of them. For customers, this introduces an element of differentiation between one GDS and another, which may be of great relevance to agents. The lowest fares of an airline may be available on one GDS and not on another, which would be very important in terms of sales for a given agent. In such cases, agents may decide to switch to another GDS providing all fares (including the lowest fares) or even opt for multi-homing. This scenario — albeit simplified — illustrates how a GDS that is not able to secure 'premium' travel content may lose market share on the agent side. Apart from this dimension of differentiation generated by airlines (possibly through bargaining with GDS providers, as discussed below), and apart from the size of the agent network (which depends on how successful a GDS provider is in securing agent subscriptions), other elements of differentiation among different GDS can be introduced by the providers themselves, namely in terms of optional services (such as additional functionalities for users on both sides of the platform) and the quality of technical support. Still, the crucial issue remains the travel-related content available, such as access to low-fare inventory, geographical coverage and types of 'non-airline' content included.

120. On the second point, as already mentioned above, alternative technological platforms (and more generally, alternative distribution channels) are already available or at least their implementation is technically and economically feasible within a relatively short term. Those platforms may allow airlines to

bypass the GDS and directly access agents ('direct link') or even end-consumers ('supplier.com') (20). This has the potential to weaken considerably the position of GDS providers as gatekeepers controlling access to their network of subscribing agents (which could then be reached directly by airlines) and the related customer base (which could make use of supplier.com set up by airlines). A major implication of this evolution in the GDS market is the change in the relative bargaining power of airlines, GDS providers and agents. In recent years, GDS providers have been faced with bargaining not only on the agent side (where they have to grant incentives in order to secure subscriptions and the agents' customer base) but also, and increasingly, on the airline side.

121. This results from the substantial efforts made supplier.coms are in part accessible to agents as well. Moreover, certain airlines operate specific Business to Trade ('B2T') websites. However, the use of supplier.com websites by agents is limited by the time and costs necessary for multi-channel search, as compared to one-stop-shop searches via the GDS platform. This tends to limit the use of supplier.coms (or B2T) by agents to a simple complement to GDS (or a temporary solution to system failure for single-homing agents). Supplier.com websites mainly target end-consumers. by airlines to reduce costs also by exploiting alternative distribution channels to GDSs, notably those available via the internet.

122. Representative of this evolution are two new types of agreements characterising the interaction between airlines, GDS providers and agents: 'full content' agreements and 'opt-in' agreements. Full content (and related discounts)

123. In order to make supplier.coms a viable alternative distribution channel for travel content, airlines may need to withhold some premium content, such as their lowest fares, from GDS providers and make it available only via the web. A first point is therefore that once supplier.coms exist and are viable, an element of differentiation may exist in terms of content made available selectively on one platform (supplier.com) and not on another (GDS). As a matter of fact, the number of bookings via supplier.coms has increased substantially in recent years.

124. This market evolution, as well as the possibility (or even the simple threat) that airlines could selectively withhold content (i.e. from one GDS provider but not from another), with a possible impact on each GDS's market shares, has obliged GDS providers to revise their strategy towards airlines. GDS providers have started to grant discounts in exchange for airlines' commitment to provide 'full content', i.e. their whole inventory, or at least the same content made available on the airline's website.

125. In other words, content has become the crucial element in determining the relative bargaining position between airlines and GDS providers. The development by airlines of their supplier.com websites with the ensuing possibility to withhold (or threaten to withhold) content from the GDS providers has improved the bargaining position of airlines vis-à-vis GDS providers and destabilised the pattern of rent extraction derived from the standard single-homing / multi-homing framework previously described, where GDS providers were able to extract rents on the airline side to be partially used to finance the acquisition of a customer base on the agent side

Conclusion (on the merger)

126. The reduction in the number of GDS providers was found not to lead to price increases on the airline side of the market even in the presence of single-homing (and a relatively high market share of the merged company) on the agent side. In fact, recent market developments, in particular the number of countervailing bargaining tools at the disposal of airlines, allow airlines to force GDS providers to lower their prices in exchange for (i) full content and/or (ii) limiting the (actual or potential) diversion of bookings towards other platforms or competing GDS providers (via surcharges and, again, the retention of premium content). Nevertheless, the improved bargaining position of airlines is not conducive to a revision

of their homing policy, so that the existing configuration involving multi-homing (airline side) vs single-homing (agent side) will continue to prevail. On the agent side, a sufficient number of GDS platforms will remain available to agents, with relatively limited costs for switching GDS provider.

127. In addition, as just stated, single-homing is sufficient for most agents to guarantee an efficient one-stop-shop access to most travel-related content (occasionally complemented by recourse to alternative channels). The fact that GDS providers need to create and maintain a sufficiently broad network of agents in order to generate demand on the airline side leaves agents in a favourable bargaining position vis-à-vis GDS providers even after the elimination of one of these providers.

Conclusion (on the theory)

128. Under some conditions (mainly the existence of significant indirect effects) the two-sided nature of a market is an important element in the assessment of a merger. Failure to take it into account may lead to enforcement errors, both overstating and understating possible competition concerns. In situations where a ‘competitive bottleneck’ is identified, it has to be considered whether platform users have any countervailing bargaining power. If that is the case, the theoretical result of the ‘competitive bottleneck’ theory, stating that the platform provider can extract all rents to the detriment of multi-homing users, has to be adjusted.

5. Conclusions

129. As Ordober points out "invoking a two-sided nature of the business will not get one off the hook in an antitrust case and, in some situations may make the predicament even worse [...] two-sided platforms may be a passing concept which calls for analytical vigilance but does not require a policy revolution"

130. The principles of competition policy remain the same whether markets are single-sided or multi-sided. The errors to avoid are a failure to identify two-sided platforms, to treat each side of the platform in isolation, to under-estimate the interdependencies of customer demand and the strength of indirect network effects, and to use analytical tools without modification in the assessment of competition in these markets. In any event, the greater complexity associated with analysis of two-sided platforms and the potential for mistakes of consequence to the overall outcome of a matter should increase the care and diligence that goes into analyzing these markets.

131. It is also too early to make any definite policy recommendations related to two-sided markets. This is because many of the conclusions from the economic models so far developed are narrow and precise in scope and their results depend on specific assumptions regarding the characteristics of competition, and individual market and industry circumstances. Further, more empirical research is necessary. For the time being a case-by-case analysis appears most appropriate. This is the approach followed by the EU Commission to date.

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