

# Two-Sided Markets: Economic Theory and Policy Implications\*

Mark Armstrong  
Department of Economics  
University College London

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## 1 Introduction and Examples

There are many examples of markets where two or more groups of participants interact via intermediaries or “platforms”. Surplus is created—or perhaps destroyed in the case of negative externalities—when the groups interact. Of course, there are countless examples where firms compete to deal with two or more groups. Firms compete for labour and compete to sell output to customers, for instance. Or an exercise gym is likely to do better if it appeals to both men and women. However, in a set of interesting cases, cross-group network effects are present, and the benefit enjoyed by a member of one group depends upon how well the platform does in attracting custom from the other group. For instance, a (heterosexual) dating agency or nightclub can *only* do well if it succeeds in attracting business from both men and women (unlike the gym example). This paper is about such markets.

Some examples include:

**ACADEMIC JOURNALS:** Journals compete both for authors and for readers. A common (but not universal) way to organize the interaction is for readers and libraries to pay and for authors to publish for free.

**CONTENT IN MEDIA MARKETS:** People are more likely to buy a newspaper or watch a TV channel the greater the variety of content it contains. In the newspaper context, this content would be “columnists” and the like. Most usually, columnists are contracted on an exclusive basis to the newspaper. Clearly, the more such content the paper attracts, the

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easier it will be able to attract readers. Also, it is plausible that columnists will, in addition to their salary, enjoy communicating their opinions to a wide readership.

**ADVERTISING IN MEDIA MARKETS:** Advertisers wish to gain access to potential consumers to tempt them to buy their products. Often advertising is bundled with other services, such as newspapers, magazines, radio or TV, which act as intermediaries between advertisers and consumers. Revenues from advertising are often used to subsidise the media product for readers/viewers. In some special cases, viewers/readers might not benefit directly from advertising, or might actually dislike intrusive advertising (which would then be a negative cross-group externality). But, for instance in the case of informative advertising, viewers/readers will benefit from the presence of advertising, as is the case in the next example.

**YELLOW PAGES:** A form of mediated advertising that is not bundled with other content are “yellow pages” directories. Typically, consumers receive one or more directories for free, while advertisers pay to be included in the book. When there is competition between directories, if there are costs involved in consulting more than one directory, consumers are perhaps more likely to use the directory with more adverts, while an advertiser will be prepared to pay more to be included in a directory with a wider readership. On the other hand, keeping readership fixed, an advertiser might prefer to be in a directory with fewer other adverts. This might be for two reasons: (i) its advert might become lost in the “clutter” of other adverts, or (ii) a reader might see an advert for a competing product and call that number instead.<sup>1</sup> This is an example of a negative *intra*-group externality.

**SHOPPING MALLS:** Continuing with the theme of matching consumers to retailers, an example where this is done physically is the shopping mall. Often, there are several malls in the relevant area which compete both for consumers and for retailers. Typically, retailers pay rent to malls while consumers have free entry (and might also have additional features, such as free convenient parking, offered to attract them). Typically, consumers care about the number of retailers when they decide which mall to visit, and obviously retailers care about the number of consumers coming through the mall. Like the previous yellow pages example, business stealing effects might mean that, all else equal, a retailer might prefer to be in a mall with fewer other (competing) shops.

**SUPERMARKETS:** A closely related example is that of supermarkets, which deal with suppliers on one side and compete to attract consumers on the other side. The principal difference between malls and supermarkets is that in the former case the “platform owner”

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<sup>1</sup>Rysman (2004) estimates the importance of cross-group network effects in the market for yellow pages. He estimates that externalities are significant on both sides of the market: consumers are more likely to use a directory containing more adverts, while an advertiser will pay more to place an advert in a directory that is consulted by more consumers.

does not directly control the retail prices (which are chosen by the individual shops) whereas a supermarket sets all its retail prices.

**PAYMENT SYSTEMS:** Still continuing with the theme of facilitating interactions between consumers and retailers, consider the various methods of paying for products, including cash and various kinds of card payment. Both consumers and retailers may derive direct benefits (in terms of convenience or security) from using one method over another. (This is the relevant surplus created from the interaction, not the surplus created by the consumer buying the product itself, which will, in many cases, occur regardless of the chosen payment method.) To the extent that a consumer only chooses a limited number of payment instruments, he/she will have regard for the number of retailers who choose to accept a given payment method. Similarly, if there are set-up costs in being able to accept a given payment method, a retailer will have regard for the number of consumers who use that method. A common contractual arrangement is for consumers to be able to use a credit or debit card with little or no charge, and for retailers to cover the costs of the transaction.

**AIRLINE RESERVATION SYSTEMS:** Air tickets are usually reserved and paid-for via computerised reservation systems. A travel agent will typically use a single such system, and airlines will wish to be listed on all major systems in order for all travel agents to be able to purchase their tickets. The equilibrium is often that travel agents are charged little or nothing for the service, while airlines often complain about the high charges they must pay to gain access to the systems.<sup>2</sup>

**TELECOMMUNICATIONS WITH CALL EXTERNALITIES:** Both callers and recipients of calls typically derive some benefit from telephone calls, which are mediated by telecommunications networks. (The recipient's benefit is termed the "call externality".) There is often vigorous competition between networks for subscribers. Subscribers generally make and receive calls, and so it is less clear that there are "two sides" in this market. However, if one thinks of "subscription to a network" as one side and "number of calls made to a network" as the other side, then this industry fits into this framework. The more calls a network receives (for instance, because it sets a low charge for delivering calls), the more attractive the network is for subscribers; and naturally, the more subscribers a network has, the more calls it will receive. An inefficient pattern of pricing can sometimes be seen, with networks exploiting their monopoly position over delivering calls to their subscribers and using the proceeds to subsidize connections to the network (perhaps in the form of free handsets).

**DATING SERVICES AND NIGHTCLUBS:** Similar features are present in the market for dating services. Each side of the market cares positively about the number of people on the other side (and perhaps they care negatively about the number of people on their own

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<sup>2</sup>See Doane, McAfee, and Hendricks (2003) for more information about this market.

side). It is sometimes the case that one side of the market is subsidized (e.g., no entry fee for women), and used to ‘attract’ the other side from whom surplus can then be extracted.

**SMOKERS AND NON-SMOKERS:** In a restaurant or aircraft, non-smokers (and even smokers) typically care about the number of people smoking in the space. Unlike many of the previous examples, this is a negative inter-group externality. Another difference with the previous examples is that the ‘platform’ can affect the extent of the externality, namely, by instituting a non-smoking policy. Such a policy presumably entails a utility loss for smokers, and in a competitive environment, an intermediary must trade off this disutility against the extra attraction it now has for the non-smokers. In the case of airlines (outside of Asia at least), the equilibrium is clearly to have a non-smoking policy, whereas for restaurants the pattern is more mixed.

This list of examples is mainly taken from “traditional” industries, partly to counteract the occasional view that two-sided markets are principally concerned with hi-tech products such as software and the internet. See Evans (2003a, 2003b) and Rochet and Tirole (2003) for further examples of two-sided markets.

## 2 Basic Issues

The main questions addressed in this paper are (i) what determines the structure of relative prices offered to the two groups, and (ii) when is the resulting allocation socially efficient? In this section we outline the main determinants of market performance.

### 2.1 Effect of cross-group externalities

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. In broad terms, especially in competitive markets, it is group 1’s benefit to the other group that determines group 1’s price, not how much group 1 benefits from the presence of group 2.<sup>3</sup>

Consider for instance the case of *Acrobat*. There are two version of Acrobat software available: the Acrobat “reader” is available free of charge, whereas the Acrobat “writer” (needed to create files) requires payment. A possible rationale for this policy might be that authors of documents are very keen for their documents to be read, but that people do not particularly enjoy reading these documents. In this case, the way to extract the

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<sup>3</sup>For instance, see section 4 of Armstrong (2004) for a model where one group’s price depends solely on the benefit it brings to the other group and not on the benefit it enjoys itself from interacting with the other group.

maximum payment from the two sides is to distribute the reading software for free in order to maximize the number of people who can read documents, and to extract all the revenue from the people who write documents. (Of course, something like the reverse happens with, say, with popular novels.)

This analysis might also apply to a yellow page directory. Such directories typically are given to telephone subscribers for free, and profits are made solely from charges to advertisers. This outcome can be rationalised if advertisers obtain a greater benefit from an additional reader than *vice versa*. Later in the paper we will discuss a further rationale for this policy which is to do with competition.

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 would like to find ways to mitigate networks effect, as discussed in the next section.

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 externalities are powerful. (And this outcome is not necessarily bad from a social welfare point of view when externalities are strong.) Another way to put this is that it can be very hard for an entrant in such markets to get started. (Think of a trying to launch a new journal, a new real estate agency, or a new dating agency.) One way to overcome this entry barrier is discussed in the next section.

## 2.2 Fixed charges or per-transaction charges?

Platforms might charge for their services on a “lump-sum” basis, which is to say, that an agent’s tariff does not explicitly depend on how well the platform performs on the other side of the market. Alternatively, if it is technologically feasible, the tariff might be a function of the platform’s performance on the other side. One example of this practice might be where a TV channel or a newspaper 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.) A related kind of tariff is when charges are levied on a “per-transaction” basis. 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). The bulk of a real estate agent’s fees are only levied in the event of a sale.<sup>4</sup>

The crucial difference between the two forms of tariff is that cross-group externalities are less important with per-transaction charges, since a fraction of the benefit of interacting with

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<sup>4</sup>In rough terms, the pioneering paper by Rochet and Tirole (2003) focusses on the case of per-transactions charges, whereas Armstrong (2004) emphasizes fixed charges. See Rochet and Tirole (2004) for a synthesis of these approaches in a monopoly framework.

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.<sup>5</sup> Similarly, if a consumer does not pay an up-front fixed fee for using a credit card, but only pays for each transaction, then he will not have to consider the number of shops that accept the card when deciding whether to start using the card.

This point implies that charging on a per-transactions basis is an excellent strategy for a new entrant into a two-sided market. 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”.<sup>6</sup>

### 2.3 Single-homing or multi-homing?

The current jargon has it that when an agent chooses to use only one platform that agent is “single-homing”, and when he uses several platforms he is “multi-homing”. (Clearly, this distinction does not arise where there is a monopoly platform.) It turns out that it makes a big difference to outcomes whether groups single-home or multi-home.

It is perfectly tractable to model and analyze the case where both sides of the market single-home.<sup>7</sup> However, it is not easy to come up with major real world examples of such a phenomenon. (Perhaps men and women might generally visit just a single nightclub in an evening, or smokers and non-smokers might visit a single restaurant in an evening, in which case this model would apply, but it is hard to think of other examples.)

Also, one might consider the opposite case where both sides join all platforms. Again, though, it is not easy to think of many examples of such markets. (One possible example is credit cards, where many shops accept several cards, and many people carry several cards. However, most people with several cards tend to favour a single card, and have perhaps been sent or supplied with a second card with really applying for it. It is important to distinguish between carrying a second credit card and actually using this second card.) The reason why this configuration is unlikely is that if (all of) the other side of the market multi-homes then there is little reason to do so yourself. To take a pertinent example, if everyone can speak

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<sup>5</sup>See section 5.2 of Armstrong (2004) for a formal argument along these lines. This argument applies when there are positive network externalities for viewers (so that viewers like adverts). If viewers dislike adverts, then per-viewer charges for advertising act to make the market more competitive.

<sup>6</sup>See Caillaud and Jullien (2001, 2003) for analysis of this point.

<sup>7</sup>For instance, see the relevant sections in Caillaud and Jullien (2001, 2003) and Armstrong (2004).

English as a second language, there is no reason for a native English speaker to invest in learning another language. Similarly, if all shops accept all major credit cards, there is no benefit to a consumer carrying more than one (and *vice versa*).

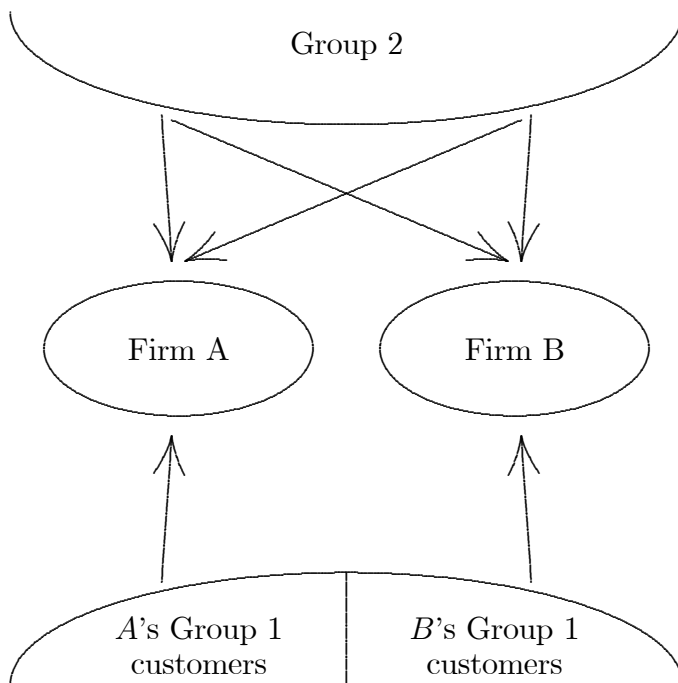


Figure 1: Competitive Bottlenecks

This leaves one remaining important case to consider.<sup>8</sup> This is where one side of the market single-homes and the other multi-homes (see Figure 1). I have sometimes called these cases “competitive bottlenecks”. There are several important examples of this—see below—and the source of the basic market failure is that the multi-homing side, if it wishes to interact with an agent on the single-homing side, has no choice except to deal with that agent’s chosen 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 view. 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, for then high prices to the multi-homing side will drive away that side and thus disadvantage the platform when it tries to attract

<sup>8</sup>This is a great simplification. Of course, there are many cases where only *some* agents on the other side multi-home, in which case it may well be sensible to multi-home yourself. For instance, if there is a danger that a shop will only accept one card, then there might be a precautionary motive to carry all major cards.

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. By contrast, the multi-homing side decides whether to deal with one platform independently of whether it deals with other platforms, and there is no competition for their custom.

## 2.4 Exclusionary contracts

There are at least two distinct types of exclusionary contracts that are relevant to two-sided markets.

*Agents must deal exclusively with one platform:* 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. Similarly, TV personalities are often required to work for a single broadcaster over the relevant period. The incentive to do such deals can easily be understood within the framework of the “competitive bottleneck” model. 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 platform’s 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.

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 easy to construct models where agents who would otherwise multi-home find it in their interest to deal exclusively with a single platform.<sup>9</sup> Indeed, in these cases we expect 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.

*Agreements to exclude rival agents from the same platform:* Many of the most important examples of two-sided markets involve retailers on one side and consumers on the other. In

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<sup>9</sup>For instance, see section 3 of Armstrong (1999)

these applications, an interesting issue is the chosen extent of competition between retailers *within* platforms.<sup>10</sup> For instance, a TV channel might charge more to show a car advert if it promised not to show a rival manufacturer's advert in the same slot. Or a shopping mall might charge a high rent to a retailer with the promise that it will not let a competing retailer into the same mall. We expect that greater retailing competition will mean less profit per consumer for a retailer but consumers will obtain higher surplus per retailer (or per retailer type) due to the lower prices that prevail with competition. Thus we would expect that if the platform allowed retailing competition it would make less money from the retailing side of the market but more from the consumer side (if it charged for entry). One hypothesis which could be investigated is: platforms would allow competition within the platform if consumers were charged for entry, but if consumers had free entry then platforms would restrict competition in order to drive up the revenues obtained from retailers. We discuss this point further at the end of the paper.

## 3 Applications

### 3.1 Call termination in telecommunications

Section 3.1 of Armstrong (2002) and Wright (2002) propose a model of competition between mobile telecommunications networks. Subscribers wish to join at most one mobile network (i.e., they single-home). People on the fixed telephony networks wish to call mobile subscribers. For a specified charge, someone can call any given mobile network, and in this sense the people who call mobile networks multi-home. A subscriber will choose the network with the tariff that leaves him with the most surplus. A network's tariff has two ingredients: the charges for subscription and outbound calls that affect the subscriber's welfare directly, and the charges the network makes to others for delivering calls *to* the subscriber (the so-called call termination charges). Unless the subscriber cares about the welfare of people who might call him, the latter charges affect the subscriber's welfare only insofar as they affect the number of calls he receives. High termination charges will typically reduce the number of calls made to mobile networks, and this is detrimental to a subscriber's welfare if he obtains benefits from receiving calls.

The prediction from this model is that mobile networks will offer relatively low charges for subscription and outbound calls but high charges for call termination. In particular, the model predicts that high profits made from each platform's monopoly on call termination are passed on to subscribers, perhaps in the form of subsidized handsets and the like. More precisely, the equilibrium call termination charge is chosen to maximise the welfare of mobile subscribers and mobile networks combined, and the interests of people who call mobile

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<sup>10</sup>Gehrig (1998) analyzes this issue. See also Dukes (2003) and Dukes and Gal-Or (2003) for models of advertising when advertisers compete for consumers. See also Baye and Morgan (2001) and Galeotti and Moraga-González (2004).

networks are ignored. This feature—that the single-homing side is treated well and the multi-homing side’s interests are ignored in equilibrium—is a characteristic of all the “competitive bottleneck” models: although the market *for* subscribers might be highly competitive, so that mobile networks have low equilibrium profits, there is no competition for providing communication services *to* these subscribers.

The policy implications of this way of looking at the market are easy to grasp. First and foremost, the unregulated termination charge will be set at too high a level from the point of view of social welfare. Whether this market failure justifies the cost of detailed regulation is a matter of judgement. Even if the market for mobile subscribers is vigorously competitive, each operator holds the same monopoly position over providing call termination to its subscribers. Thus the need to regulate call termination, if judged appropriate, is not a temporary measure until competition somehow becomes effective but is always needed. Moreover, there is no justification for a policy that controls the termination charges of “large operators” while leaving smaller operators free to set such charges as they like. (Such a policy will give smaller operators an artificial advantage in being able to attract subscribers.)

It essentially makes no sense to speak of *the* market for mobile telephony in this case: there is a market for subscribers, which is—to a greater or lesser extent—competitive, and there is a market for call termination, which is monopolistic. These markets are linked, and monopoly profits in one segment are “competed away” in the other segment. The fact that platforms do not make excessive profits overall does not mitigate the social costs of monopoly pricing for call termination.<sup>11,12</sup>

### 3.2 Advertising in media markets

One of the most natural applications of these ideas is to advertising in media markets. These have long been recognized as being “two-sided markets”, where the media platform (newspaper, magazine, radio station, TV channel, and so on) provides attractive content in order to attract readers (or viewers or listeners), and this audience is then “sold” to the advertisers. Some of these markets fit the competitive bottleneck framework better than others. For instance, due to time constraints many people read just a single newspaper each day. If an advertiser wishes to reach that reader (at least using the newspaper medium) it must place an advert in that particular newspaper, and pay whatever that newspaper asks. Similarly, many people listen to a single radio station most of the time. Also, to the extent that there are multiple yellow pages directories, it is plausible that many people will

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<sup>11</sup>A related situation occurs with auctioning monopoly franchises. Suppose a government decides to auction off the monopoly right to supply some service, and that the price of the monopoly service is not regulated. The franchise is awarded to the bidder who offers the most to the government. Then the likely outcome of this process will be (i) a monopoly price for the service (with the usual welfare losses) and (ii) almost all monopoly profits are competed away in the auction process and passed onto taxpayers.

<sup>12</sup>See Competition-Commission (2003) for an investigation into the UK market that makes use of the kind of analysis described in this section.

consult a single directory when they are looking for something (e.g., people might consult the “thickest” directory since that will offer them more choice), and so an advertiser has to place an advert in that directory to have a chance of obtaining business from that person.

On the other hand, television viewers switch channels frequently. If an advertiser wishes to reach the bulk of viewers, he need not place an advert on all channels, but only on a single channel (e.g., the channel that has the lowest advertising charges) and hope that viewers will eventually switch onto that channel at the right time.<sup>13</sup> Specialist magazines (e.g., about cameras) are probably in between: some readers will get one such magazine, but enthusiasts will buy two or more; some advertisers will place an advert in each magazine (which they need to do to reach the single-homing readers), and some will place an advert in a single outlet (i.e., they will single-home).<sup>14</sup>

Anderson and Coate (2003) and section 5.2 of Armstrong (2004) present a model where media platforms compete for readers/viewers/listeners (say readers from now on), and advertisers wish to gain access to these readers. Readers might view adverts as a nuisance (in which case, all else equal, they prefer to use the platform with the lower level of advertising) or they might obtain useful information from the adverts. Suppose that readers use a single platform, so that the competitive bottleneck framework is appropriate. In this case, to reach a particular potential consumer, an advertiser must place an advert in that consumer’s chosen platform. It is natural to suppose that the amount that an advertiser is willing to pay a platform for an advert is proportional to the number of consumers who use that platform. Over a wide range, the more adverts a platform shows, the more advertising revenue per reader it will obtain. A platform will choose its level of advertising to trade-off the revenue from advertising it obtains with the extra utility (or disutility) that its readers enjoy from extra advertising.

To be specific, suppose that if a platform shows  $n$  adverts it can obtain advertising revenue per reader of  $R(n)$ . Suppose that each reader has utility  $U(n)$ , which might be decreasing, from seeing the  $n$  adverts. Then a platform will choose the number of adverts  $n^*$  to maximize  $U(n) + R(n)$ . (I assume here that costs of operating the platform are not affected by the number of adverts.) However, the total surplus of advertisers is some increasing function  $n$ , say,  $V(n)$ . Social welfare is maximized when the number of adverts maximizes  $U(n) + R(n) + V(n)$ , rather than just  $U(n) + R(n)$ . Thus, in this model the interests of advertisers are ignored, and there is *too little* advertising. This is precisely analogous to the previous result that there were too few calls made to mobile subscribers.

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<sup>13</sup>However, if advertising is assumed to be “persuasive” in form, and *each* viewing of an advert by an individual is valuable to the advertiser, then the fact the viewers switch channels does not overcome the monopoly problem: a channel has a monopoly over provided advertising access to its viewers for the period of time when those viewers watch the channel.

<sup>14</sup>See Kaiser and Wright (2004) for more on this industry. They provide evidence in the case of photography magazines that 5-10% of readers buy two magazines and 20-30% advertisers place an advert in two magazines. It is strange that there is so little multi-homing by advertisers, given that there essentially single-homing by readers.

One further interesting possibility to note is that the revenue from advertising,  $R(n)$ , might be so large that readers are offered access to the platform for free. Since a platform receives additional advertising revenue  $R(n)$  from each additional reader it attracts, the effect of this advertising revenue is exactly as if the platform's marginal cost of supplying service to an additional reader is reduced by  $R(n)$ . If  $R(n)$  is sufficiently large, then, if feasible, platforms would actually like to *pay* readers to use the platform, so that the platform can then benefit from the large advertising revenue. Since it is hard to see how people can be paid to read a newspaper or watch TV, the outcome is that readers are offered the service for free. This provides a rationale for why yellow pages directories are supplied for free, why some local newspapers are free, and also why we might expect to see free-to-air television funded by advertising continuing to exist even when the technology now exists to extract payment from viewers.

The policy implications of this view of the market are again clear. The price for advertising is too high, although whether this is justification enough to intervene is a matter of judgement. The disadvantage caused to advertisers is not mitigated if the market for readers or viewers is very competitive. Similarly, however, advertisers are not disadvantaged further if two newspapers merge.

### 3.3 Shopping malls and supermarkets

The final application I wish to cover is to shopping malls and supermarkets, platforms that bring consumers and products physically together. There are very close connections between this and the previous application where media outlets were used to bring consumers and products together in an informational sense.

*Shopping malls:* Consider first the case of shopping malls. A shopping mall is a commercial enterprise that I assume sets the rents for shops and, potentially, sets an entry fee for consumers. I assume that the shops set their own retail prices to consumers, and that rents paid to the mall are lump-sum in nature (and are not revenue-sharing agreements, for instance). Assume for now that each shop is a local monopoly, and there is no competition between shops in the mall. It is natural to suppose that consumers visit a single mall over the relevant period—the mall that leaves them with the most surplus—and that people do not buy a book in one mall then go to another to buy wine. As such, this framework fits exactly into the competitive bottleneck model discussed earlier.

Suppose first that malls charge consumers for entry. Consumers are more likely to visit a mall with many shops and/or with a low entry fee. Similarly, a shop is more likely to locate in a mall if that mall is visited by many consumers and/or if it has a low rental charge. Given the consumers single-home, if a shop wishes to have the chance to sell to a particular consumer it must locate in that consumer's favoured mall. Again, then, platforms hold a monopoly over providing access by shops to their consumers, and can charge rents accordingly. Malls will not charge sky-high rents, though, since one means with which to

attract consumers is to have a large variety of shops. But the outcome is that rents are chosen to maximize the welfare of consumers and the mall, while the interests of the shops are ignored. The outcome is that rents are too high, and there are consequently too few shops, from a social welfare point of view. Shops are exploited, but this is not necessarily the result of malls having significant market power in the market for consumers (because of geographical isolation, for instance).

As in the case of media platforms, it is quite possible that a mall obtains so much additional rental revenue from shops for each additional consumer that it attracts, that the mall chooses to let in consumers for free. It would like to pay consumers to turn up at the mall, but that is rarely feasible, and the next best thing is to let consumers enter for free.<sup>15</sup> (It is possible to introduce further degrees of subsidy, for instance by having free car parking, or even free busses to the mall, or providing extra features—cinemas and other entertainment services—in order to attract further consumers in.) Thus, with this interpretation, malls choose not to charge consumers for entry, not because they cannot do so for technological reasons, but because they do not wish to.

*Degree of competition within a mall:* As well as the balance of its charges levied on shops and consumers, a shopping mall also has to decide about how much competition to allow within the mall. Most shops have rivals to some degree, and the mall must decide, for instance, whether to have a single bookshop or to have more than one. Shops facing limited intra-mall competition will presumably charge higher prices than they would if there was a rival in the same mall. Thus, with limited competition in the mall, a mall can charge more for rent to shops but less to consumers (who know they will face higher prices once they reach the mall). However, in many cases, the gains to consumers from competition will outweigh the losses to shops, since the deadweight loss due to prices being above marginal cost is lessened. Thus, when consumers *can* be charged for entry, a plausible outcome is that the mall will prefer to have competition: its rental income from shops will decline, but the extra amount they can extra from consumers more than makes up for this loss. If for some reason malls cannot charge consumers for entry, then the prediction would be that malls would prefer less competition, since their sole source of revenue comes from profits generated by market power within the mall.<sup>16</sup>

*Supermarkets:* The main difference between supermarkets and malls is that in the former case

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<sup>15</sup>It might be possible in the future in the UK that some landing fees in retail-intensive airports will be negative, which would have the implication that airlines are being paid to deliver shoppers to the airport's retail mall!

<sup>16</sup>Thus in the models of Baye and Morgan (2001) and Galeotti and Moraga-González (2004), where consumers wish to learn prices offered by competing firms from a platform, the platforms charge consumers a positive price and in return they set a low advertising charge in order to stimulate competition. If for some reason the platforms could not charge consumers, then this would mean they would choose to have less competition on the platform.

the platform sets the retail prices directly.<sup>17</sup> Nevertheless, some predictions of the shopping mall framework carry over to the supermarkets case. Again, a natural assumption is that consumers prefer one-stop shopping, and visit a single supermarket for their (say) weekly grocery shop. This means that a supplier who wishes to reach a given consumer must supply that consumer’s chosen supermarket and take whatever that supermarket is willing to pay for its supplies. The more a supermarket offers to pay for supplies, the greater the number of suppliers who will be willing to supply. A consumer is more likely to visit a supermarket which has a wide variety of products and/or which has low prices. The outcome in this framework is that supermarkets will choose its supply prices (and the consequent product range) in order to maximize the welfare of consumers and the supermarket, and the interests of suppliers are ignored. The supply price is too low, and the range of products offered for sale is also too small, from the viewpoint of social welfare. To the extent that there is vibrant competition between supermarkets for consumers, however, this outcome is to the benefit of consumers. Supermarkets use their strong bargaining position over suppliers (due to the monopoly they hold over providing access to their consumers) to drive down supply prices, and these low prices are then passed onto consumers.

## 4 Conclusions

The aim of this note has been to clarify some of the policy implications of the recent literature on two-sided markets. I focussed on the case of “competitive bottlenecks”—where agents on one side of the market chooses to go to one platform *or* another, while agents on the other side choose to join all platforms to interact—since this case seems to be particularly important in practice.

The reason why one side chooses to “single-home” depends on the specific context: most people wish to subscribe to a single mobile telephony network; many people have the time to read only a single newspaper per day, and many people prefer “one-stop” shopping to visiting a variety of locations for their shopping needs. The group that wishes to interact with the single-homing group does not have this preference for single-homing, at least in the applications described. To interact with an individual on the single-homing side—in the applications, to make a call to a telephone subscriber or to sell a product to a consumer—an agent on the other side must join that individual’s platform. As such, a platform holds a monopoly in providing access to its single-homing customers. Platforms do not *compete* for business from the multi-homing side.

The outcome is the following. 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: in the applications this took the form of cheap (or free)

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<sup>17</sup>See Smith and Hay (2004) for a full analysis of the differences between supermarkets and shopping malls.

handsets for mobile subscribers, newspapers with a cover price below cost, or free entry into shopping malls. If the market for single-homing customers is fierce (this depends on how close substitutes the platforms' services are to the single-homing agents), the platforms will fully dissipate the monopoly profits from the multi-homing side in their attempts to attract the other side. Even if the platforms do not make excessive profits overall, however, there remains a market failure in these markets, which is that the multi-homing side faces too high a charge from the point of view of social welfare. In the applications, this implied that it cost too much to call a mobile subscriber, that it cost too much too much to place an advert in a newspaper, and that shops paid too much to locate in a mall. This outcome—where profits are not excessive but there is a sub-optimal balance of prices—is reminiscent of models of switching costs, where firms compete hard to sign up new customers with low initial prices in order to reap monopoly profits from these customers once they are locked in.<sup>18</sup> However, in models of switching costs, it is the same agent who is first subsidized and then exploited, whereas in these competitive bottleneck models there is a distributional impact of the pricing policy: one group is exploited in order to subsidise another group's consumption.<sup>19</sup>

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<sup>18</sup>For instance, see Klemperer (1995)

<sup>19</sup>In the case of mobile telephony, however, the distributional effect is nowadays less important. Many or most people both make calls to mobile networks and are subscribers to such networks. In this case, people are treated approximately equally, but most of them would be better off if they paid less to call mobile networks and paid more to subscribe to such networks.

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