

# The Analysis of Tying Cases: A Primer

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**Abstract:** A large number of antitrust investigations in the US and in Europe concern various kinds of tying behavior by firms with market power. This primer analyses factors that make ties more likely either to hurt or to benefit consumers. It argues that: (1) The impact of tying on competition in the tied market ranges from “little impact on the rivals’ ability to compete” to “total exclusion of competitors”. Where it stands in that range depends on a number of factors: the marginal cost of manufacturing the tied product; the rivals’ ability to differentiate horizontally or vertically their offering from the tied product (that is, to offer some features that are not available in the tied product); and, if the market is multi-sided, the ability to differentiate, in the side where there is no tie, through technological features, in-house supply, or exclusive contracts with third-party vendors, and the ease with which users on the tying side can multi-home. (2) Tying should be submitted to a rule-of-reason standard. Firms with market power may engage in a tie in order either to monopolize the competitive segment or to protect their monopoly power in the monopoly segment. But, like firms without substantial market power, they also use ties for a variety of reasons that enhance economic efficiency (distribution or compatibility cost savings, accountability, protection of intellectual property, legitimate price responses), or at worst have ambiguous effects on social welfare (price discrimination). (3) Tying should not be a distinct offense but considered as one possible mechanism of predation. Like many other corporate strategies that make one’s products attractive to consumers, tying has the potential of hurting competitors, and therefore is just one in a large range of strategies that can be employed to prey on them. Competition policy therefore should analyze tying cases through the more general lens of a predation test.

**Keywords:** Tying, exclusion, predation, competition policy.

## 1. Preview

A large number of antitrust investigations in the US and in Europe<sup>2</sup> relate to various kinds of tying behavior by firms with market power.<sup>3</sup> For example, a highly visible US case, resulting in the largest settlement in antitrust history, concerned Visa and MasterCard's tie of

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<sup>2</sup> In Europe, tying cases are treated under Article 82(d) of the EC Treaty, which states that an abuse by a dominant firm may consist in "making the conclusion of contracts subject to acceptance by the other parties of supplementary obligations which, by their nature or according to commercial usage, have no connection with the subject of such contracts."

<sup>3</sup> Some of the court cases are discussed in detail in Nalebuff (2003, part 2).

debit and credit cards; the two associations agreed in 2003 to pay \$2 billion and \$1 billion, respectively, to a class of merchants and to lower their interchange fees.

While one may lament the existence of market power in the tying market, it does not necessarily follow that the tying action hurts consumers. This primer analyses factors that make ties more likely either to hurt or to benefit consumers. It does not provide a turn-key methodology that would enable competition authorities to determine, mechanically and unambiguously, the impact of a tie; its more limited objective is to list a set of relevant considerations that must be carefully examined before forming a judgment.

This paper argues that tying is likely to be systematically harmful to consumers when it is used a tool of predatory action, and should not be treated as a separate offense. It is important therefore to make the analysis of the consequences of tying consistent with what we know about predation and the circumstances under which it represents a realistic threat to healthy competition.

Figure 1 suggests a natural checklist for the antitrust analysis of tying cases, building (with some nuances) on a three-step procedure that is familiar in antitrust reasoning.<sup>4</sup> The three steps hardly require elaboration. Note, though, that the antitrust doctrine has long recognized that we should be more interested in protecting consumers (step 2) than in protecting competitors (step 1), or to put it differently, that competition is often a means to enhance consumer welfare, but in no way an end<sup>5</sup>. Indeed, the main reason for being interested in step 1 is as a way of thinking about possible causes of harm to consumers.



Figure 1

The paper's organization follows this checklist. It first delineates circumstances under which a tie is likely or unlikely to reduce competition in the tied market (step 1). Three key characteristics of the tied market are emphasized: unit production costs, scope for differentiation, and multi-sidedness (a multi-sided market is one in which firms are successful only if they get on board multiple categories of users who want to interact with each other).

<sup>4</sup> To see the link between this three-step approach and the standard treatment of tying cases under Article 82(d) of the EC treaty, note that step 1 corresponds to the identification of a restrictive impact on competition in the tied good market, and step 2 in part to the question of the existence of an “objective and proportionate justification” for the tie. The identification of a dominant position in the market for the tying product bears both on steps 1 and 2: A dominant position increases the restrictive effect on competition in the tied market and makes it more likely that the tying firm later recoups its losses if the intent is indeed anticompetitive.

<sup>5</sup> One can argue, though, that the standard treatment of tying cases fails to satisfy this basic precept, since it usually contents itself with a demonstration that competition in the tied market is foreclosed (step 1).

The analysis then proceeds to step 2. It develops a series of reasons why ties may benefit or hurt consumers. In particular, ties are likely to enhance consumer welfare when they reduce distribution costs, lower the cost of ensuring compatibility, enhance accountability in case of malfunctioning, are necessary to protect intellectual property, and are “competitive responses”; they have ambiguous effects when they are employed for price discrimination purposes; and they are anticompetitive when they aim at monopolizing the competitive segment or at protecting the monopoly segment. Consequently, the impact of tying by a dominant firm is best assessed under a rule of reason.<sup>6</sup>

I then argue that it is hard to think of any reason why tying ought to be a distinct offense (distinct, that is, from a more general offense of predation or the broader concept of monopolization / abuse of dominant position). The reason why we may be concerned about tying by a dominant firm is that tying serve more to hurt and eliminate rivals from the tied market than to enhance efficiency in the ways listed above. Tying is one of the many strategies that dominant firms can employ for anti-competitive reasons. Low prices, investment, patent accumulation are other examples of such strategies; like tying, they are often motivated by efficiency reasons that also benefit consumers, but they are sometimes misused. This suggests that tying cases should be analyzed as predation cases. Step 1 indeed relates to a standard step in predation cases: is the strategy likely to discourage rivals (induce exit, discourage entry)? Step 2 speaks to the question of whether the dominant firm employs the strategy to raise its profit, or to impose losses on itself and its rivals and trigger the rivals’ exit. If the latter, the analysis may be completed by a recoupment test, investigating whether the dominant firm is likely to make up through future monopoly power the shortfall in profit associated with the predatory act.

## **2. A few definitions**

To fix ideas, let us consider the following simplified setting of Figure 2, which we will later enrich as needed. There are two segments, the monopolized and the (potentially) competitive ones. An integrated firm is the sole producer of the monopoly good, M, and has its own offering, C, in the competitive or “adjacent” market. Independent producers are also present in the competitive market and have offering C' that competes with C. Goods C and C' are valueless unless combined with M; M may or may not have a stand-alone value when not combined with C or C'.

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<sup>6</sup> See Evans et al (2003) and Evans-Salinger (2004) for calls for a rule of reason treatment and for alternative, but related checklists to deal with tying cases.

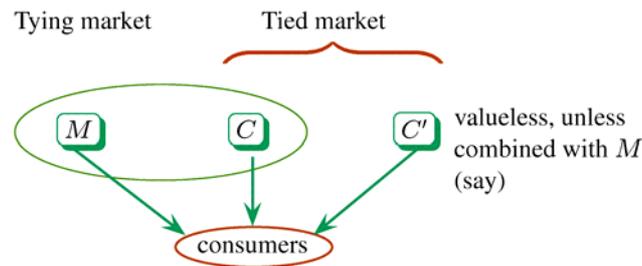


Figure 2

## 2.1 Defining equal access

(a) *Complete foreclosure*: The integrated firm forecloses the competitive segment if it makes it impossible for  $C'$  to operate. For example, a durable good producer may demand exclusivity and prohibit buyers of the durable good ( $M$ ) from using independent service operators (ISOs) for after-sale services ( $C'$ ); alternatively, it may refrain from communicating technical specifications to manufacturers of spare parts, preventing them from building compatible components.

(b) *Technological equal access*. We define equal access in technological rather than commercial terms:  $C$  and  $C'$  have equal access to  $M$  if integrated and independent producers in the complementary segment (producing  $C$  and  $C'$ , respectively) can produce functionally equivalent products provided they have similar talents and sink comparable investments. Put differently,  $C$  and  $C'$  may differ due to their designers' expertise or R&D budgets, their design option or just chance, but not because the integrated producer has privileged access to or knowledge about specific functions or interfaces of  $M$ .

Two questions arise about equal access in this technological sense. First, is it desirable? A simple example suffices to show that the answer is not always “yes” – everything depends on costs.<sup>7</sup> Even in the absence of favoritism or corruption in the refereeing process, French-speaking economists have an edge for publishing in French-speaking economics journals over non-French speaking economists, who, among other things, must translate their work at each step of the submission process. Ensuring equal access, in which each would have an equal chance of publication for a given effort, would require the journals to accept submissions in other languages and to offer a free but excellent translation of all submitted papers. This (rather inconsequential) example illustrates a more general point: Different firms inherit or select different approaches or technological options. Ensuring equally effective internal and external interoperability requires an effort on both sides. Even leaving aside the question of whether interoperability is worth this effort, antitrust authorities face a difficult technological challenge of trying to figure out the least-cost way of achieving it, the integrated firm and its competitors each trying to shift the burden of achieving compatibility to the other side.

The second question about technological equal access is whether it implies that the two products  $C$  and  $C'$  are equally likely to succeed in the competitive market. Once again the answer is “no” — even when the offerings are similar and the integrated firm has no anti-competitive intent. Other things being equal,  $C$  is more likely to take the upper hand in that market despite technological equal access, because of the complementarities between the two

<sup>7</sup> This example is one related to “vertical exclusion” (in which one of the two complementary goods is not sold to consumers — see Rey-Tirole 2003 for a discussion), but its jest carries over to “horizontal exclusion”.

products. A lower price for C boosts the demand for M, and thus the integrated firm has more incentive to charge a low price in the competitive market than the independent one, which does not “internalize” the beneficial impact of a reduction in the price of C’ on consumer demand for M.<sup>8</sup> Note that the integrated firm would *benefit* from a reduction in the price of rival good C’. Complementary gives it no reason to wish that its own price be lower than the rival’s – the asymmetry results from the fact that it has the power to set its own price but no power to set the rival’s.

## 2.2 Adding royalties

While the outcome of competition in the tied market will depend on pricing strategies in that market, it is important to note that it may not depend on the price charged for the monopoly good M or on whether the monopolist levies a royalty on producers of C’ for access to/interoperability with M (for example, M may charge an independent content provider, a videogame developer or a music store say, per game or per song). It is sometimes argued that the existence of such a royalty implies that producers of C and C’ face different marginal costs (since the division producing C either does not pay such royalties or else internalizes the fact that these royalties go to an affiliated entity), and so there is no “level-playing field” in the adjacent market despite equal technological access. However, this reasoning is incomplete. A royalty  $a$  levied on each unit of the rival’s good sold to consumers (the equivalent of an access charge to a local loop bottleneck) need not put C’ at a competitive disadvantage relative to C. While the rival’s marginal cost of production increases by  $a$ , so does the integrated firm’s (opportunity) cost of producing C. When wooing a consumer of the adjacent good away from producers of C’, the integrated firm foregoes royalty  $a$ , and thus the royalty  $a$  becomes part of the integrated firm’s marginal cost of producing C. Hence, a royalty levied on C’, while raising the price of C’ *and* C and therefore reducing demand in the adjacent segment, does not intrinsically affect the market shares of C and C’ in this segment: it is competitively neutral.<sup>9, 10</sup>

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<sup>8</sup> See, e.g., Farrell-Katz (2000) for an analysis of the classic "Cournot effect", according to which integration reduces the overall price. So, for example a software platform vendor will price internally developed applications more aggressively than rival application developers. This differential in incentives is however alleviated by the durability of the monopolized product, since a reduction in the price of applications or after-sale services does nothing to boost the (past) demand constituting the installed base.

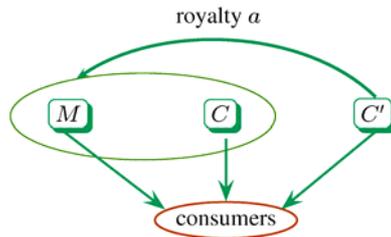
<sup>9</sup> As usual, things are more complex than suggested by this "benchmark reasoning". First, the reasoning clearly rests on the integrated firm's wooing a customer away from its downstream rivals. That is, there is a one-for-one substitution. While this assumption is fine in a world of perfect competition with undifferentiated products or in an Hotelling model of price competition with differentiated goods, more generally a competitive action by the integrated firm also has a demand expansion effect. Then, an extra unit sold by the downstream affiliate corresponds to a reduction of volume sold in the wholesale market of less than one. Gans and King (2004) offer a general analysis along those lines. They show that, for integration not to drive any differences in competitive behavior between the downstream affiliate of the integrated firm and its non-integrated downstream rivals, the marginal access price must be equal to the marginal cost of giving access. As they point out, this is easily seen in the extreme case of Cournot (quantity) competition with perfect symmetry (except for integration) downstream. Let  $q$  and  $q'$  denote the outputs of C and C',  $P(q+q')$  be the inverse demand function, and  $c$  the marginal cost of access. Then C' has profit  $q'[P(q+q')-a]$  and C has profit  $q[P(q+q')-c] + (a-c)q'$ . The first-order conditions are:

$$q'[(dP/dQ) + P] = a \quad \text{for C'}, \text{ and}$$

$$q[(dP/dQ) + P] = c \quad \text{for C.}$$

So  $q=q'$  if and only if the access price is a passthrough ( $a=c$ ).

The policy of setting the access price equal to the marginal cost of access however ignores what is often the very reason for the existence of the upstream bottleneck: the existence of fixed costs to be recouped in downstream markets. Laffont and Tirole (1994, 1996) characterize socially optimal access prices in a variety of



**Figure 3**

It is therefore important to understand why the argument that a royalty or access charge puts competitors at a disadvantage resonates in many people’s mind. This is perhaps due to the fact that a royalty, although part of the integrated firm’s marginal cost of producing the downstream good C, makes it possible to prey on competitors without charging very low or negative prices for C. When marginal costs are low, in the absence of royalty and with equal technological access, an integrated firm that seeks to prey on its rivals in the competitive market must do so through a very low price, perhaps a negative one (which creates obvious problems of opportunistic purchases by consumers). By contrast, the integrated firm may use royalties to “squeeze” competitors out of the market without having to charge low or negative prices for C. But this reasoning has two important implications. First, the predatory action is the excessively low price charged for C by the integrated firm relative to the opportunity cost of C (which, remember, embodies the royalty  $a$ ), not per se the royalty charged by M. Secondly, the case should be analyzed as a predatory case, with a focus on the voluntary loss of current profits by the integrated firm in the hope of recouping this lost profit through rivals’ exit in the future.

### 2.3 Defining tying

Let us next recall the standard definitions of *tying*, *bundling*, *joint distribution and integration*. *Tying* refers to the behavior of selling one product (the tying product) conditional on the purchase of another product (the tied product). *Bundling* refers to the practice of selling two products together. Pure bundling means that the products are available only as a bundle.

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environments; these access prices usually exceed marginal costs, and deliver equal market shares for C and C' in "symmetric cases", but not in other cases (asymmetric qualities, entrant market power, and so forth). Optimal prices can be approximated through a global price cap.

<sup>10</sup> A different issue arises when regulators or antitrust authorities try to regulate the rate of return on the monopoly segment. This regulation rests on the view that M is an essential facility, that is an infrastructure owned and controlled by a dominant firm, that is extremely costly to duplicate, and for which foreclosure is the main reason why the dominant firm denies access (see AT&T vs MCI 1982); and that this essential facility, absent regulation, would make an excessive rate of return, that is not in relation to investment or innovation. The corollary is then the design of access policies, such as the regulation of access price and quality, and the attempt to define interoperability.

This confers no easy task on competition policy officials. While their counterparts (e.g., the commissioners) in regulatory agencies lament informational asymmetries with the firms they regulate, competition policy officials cannot even avail themselves of the large staff and permanent data collection of these agencies. Yet, they have to answer complex questions such as: In which segments should platform (M)’s fixed costs be recouped? What is a reasonable rate of return on investments in the presence of technological and commercial uncertainty? Given that unbundling cannot be widespread, what are the key components to be unbundled? Does unbundling forgo some efficiency gains of tying?

The difference between tying and (pure) bundling is that the tied product is available on a stand-alone basis under tying, but not under (pure) bundling. This distinction however is inconsequential if, as we assumed for illustrative purposes, the tied product is valueless without the tying product. Under mixed bundling, the products are available both on a stand-alone basis and as a bundle; furthermore, the price of the bundle is smaller than the sum of the two individual prices. Pure bundling is a special case of mixed bundling, since buying the bundle is really the only feasible option if the prices of the individual products are high. *Joint distribution* of the two products describes a situation of bundling in which the two goods are assembled by the manufacturer rather than by the consumer. For example, cars come with an engine, a steering wheel and tires. Joint distribution differs from bundling if consumers incur a transaction cost from either acquiring C independently of M, or from replacing C by C'.<sup>11</sup> Finally, all situations may also involve *integration*, i.e., some interoperability between M and C that is unavailable to C' (and therefore a lack of technological equal access).

A complex issue relates to the notion of "*distinct products*". In legal cases, two products are deemed distinct if, in the absence of tying or bundling, consumers would purchase the products separately. This obviously is a vague criterion. The act of purchasing separately depends on pricing, delivery, guarantee, and assembly offerings. It furthermore has conceptual drawbacks. For one thing, economic theory with its emphasis on a fine partition of goods is of little help in drawing a line between distinct and non-distinct products. Does the fact that Ikea or Shaker Workshop offer their customers to pay less for furniture to be assembled by the consumer (or in the latter case a choice between cheap non-assembled and expensive assembled furniture) imply that other furniture makers, who only deliver assembled furniture engage in a tie? Economic theory would just treat non-assembled furniture as items of lower quality than assembled furniture (and similarly a disabled software program as an inferior version of the fully-enabled version<sup>12</sup>).

More concretely, such a distinction runs the risk of creating asymmetric incentives for firms; take the case of a commercial software vendor who, when facing security threats, has the choice between improving the code to limit the number of weak spots and offering antivirus and firewall services. According to the definition, the latter would be considered a tie, while the former would not. But the two may well be two different ways of achieving a given objective.

Leaving aside the notions of joint distribution and integration, which relate to the notion of equal access discussed above and to which we will come back occasionally in this paper, let us focus on purely commercial aspects. It is tempting to consider "bundling" a form of exclusionary strategy and "unbundling" a form of competition-friendly behavior. This identification might however be misleading. As we will see, a bundle in some circumstances may have a limited exclusionary impact on competitors. Conversely, an integrated firm may be able to easily "squeeze out" rivals while fully unbundling its products: To this purpose, it may suffice to charge a very low price for C.

### **3. Is tying likely to reduce competition in the tied market?**

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<sup>11</sup> For example, C may need to be un-installed in order for C' to be usable.

<sup>12</sup> On "damaged goods," see e.g., Deneckere-McAfee (1996).

Let us first look at the impact of a tie on the ability of rivals to compete in the tied market. Clearly, a tie tends to hurt rivals; the question is "how much"? Needless to say, it is impossible to define precisely the notion of "reduction in competition". In practice, the impact may range from "little impact on the ability of rivals to compete" to "total exclusion of competitors", with various intermediate degrees of reduction in competition. At best can we list factors that amplify or reduce the impact of a tie.

#### *How large are unit production costs?*

When two goods are tied together, the effective price for buying the second good for a customer who has already bought the first is zero. Whether this is likely to have predatory consequences in the market for the second good will depend, therefore, on the marginal cost of production in that market. Consider the hypothetical example of a monopoly car manufacturer, and suppose that cars come with an engine and tires, which for the sake of the argument have little value in a second-hand market. Given the cost of manufacturing an engine or tires and the concomitant prices, the consumer is unlikely to replace these components by those produced by a company not under contract with the car manufacturer, even if technological equal access obtains. The commercial tie is then akin to a technological foreclosure in that rival engine or tire manufacturers cannot get access to the tied markets, since they would have to sell at a price close to zero in order to compete with the integrated firm.

More generally, suppose a consumer purchases the bundle  $\{M, C\}$ . The consumer may then have no demand for  $C'$  even if the latter is better adapted to her needs or if  $C'$  offers superior features. When the unit (marginal) production cost, and therefore the price charged by competitors, are high, the extra cost incurred by the consumer when consuming  $C'$  is not offset by sufficient benefits, unless  $C'$  has a tremendous edge over  $C$  or is sufficiently differentiated. The tie then *de facto* forecloses competitors. For this reason, antitrust authorities have traditionally considered "tying" a form of "exclusionary behavior".

In the new economy, though, some goods, including software products, have extremely low unit production costs (by contrast, they often involve large fixed costs, i.e., costs that are independent of the number of customers or their usage). Tying is then akin to selling at a price close to marginal production cost. To be certain, and as is well-known, prices in the vicinity of marginal costs do not allow market participants to recoup large fixed costs in such industries. In the presence of substantial fixed costs, static competition, that is the long-run co-existence of multiple firms (as opposed to dynamic competition, in which firms attempt to leapfrog each other and recoup innovation costs through temporary monopoly positions) requires tacit collusion, or capacity constraints, or differentiated products, or else profits to be reaped in an adjacent market. In the absence of these conditions, competitive pricing results in a shake-out and (perhaps temporary) monopolization of the market.

#### *Can competitors differentiate in the tied market?*

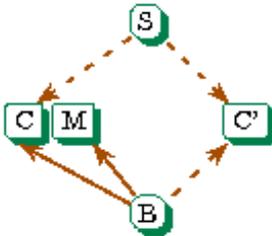
For products with a low unit production cost and a large fixed cost, the fixed cost needs to be recouped through prices above marginal costs. Suppose that  $M$  and  $C$  come as a bundle, and that consumers can further purchase  $C'$ , and either replace  $C$  by  $C'$  or use  $C$  or  $C'$  in turn depending on the application that is being made of the complementary product. In case

of a tie, consumers, who get C for free, will pay for C' only if C' adds value, as when it is tailored to their specific needs or offers innovative features. Note that “adding value” does not imply that C' is superior to C in an absolute sense. Rather, it suffices that C' offer to some or all consumers some features that are absent or inferior in design in C; C may dominate C' in other respects. Thus, a tie need not preclude competition if independent producers in the competitive market differentiate relative to the tied product.<sup>13</sup>

*Is the competitive market multi-sided?*

A particularly interesting special case of competitor differentiation arises in the context of multi-sided markets, which include a large number of new and old economy markets. Firms in such markets must get multiple sides on board in order to be successful. They must attract both users and developers (software and videogame industries), “eyeballs” and advertisers (newspapers, portals and TV networks), cardholders and merchants (payment systems), and so forth.<sup>14</sup> Usually one side has no interest in the product unless the other side is also on board. Two-sided markets are a sub-class of a broader class of markets exhibiting network externalities – i.e., markets in which consumers are more eager to consume provided other consumers also consume. Antitrust authorities are often concerned that markets exhibiting network externalities may “tip”. Tipping refers to the dynamics of a market with network externalities, in which it is difficult for several producers to co-exist profitably and in which a firm with even a small edge over its rivals stands a good chance to take the entire market.

In a two-sided market, C may be tied to M on one side of the market, but not on the other side (see figure 4). For example, payment systems such as Visa or American Express, usually require that the merchants (S for “sellers” in figure 4) accept all cards issued by the system, but do not impose any tie on the consumer side (B for “buyer” in figure 4). Another example is provided by Sunday papers, where the paper is tied with a magazine on the consumer side, but may or may not be tied on the advertiser side.



**Figure 4**

<sup>13</sup> Comparisons in the extent of differentiation here refer to within market (i.e. within the tied market) comparisons. As Miguel de la Mano pointed out to me, different comparisons can be made when M competes with a differentiated substitute M'. If M' is more differentiated from M than C' is from C, then M' may lose more than C' from a tie of M and C.

<sup>14</sup> See, e.g., Rochet-Tirole (2003 2004) and the references therein. Other multi-sided markets include matchmakers and marketplaces (exchanges, yellow pages, on-line auctions, real estate agencies, dating agencies) and telecoms and internet networks. Evans et al (2004) analyzes two-sidedness in the more specific context of the software industry.

Multi-sidedness may make a difference for the ability of C' producers to withstand a tie of C with M. Even if these independent producers of the competitive good are unable to differentiate their *technologies* in the eyes of users (B):

- ✓ they may be able to differentiate their technology on the other side (S), and thereby attract and make margins on that other side;
- ✓ they may sign exclusive deals or produce their own offerings on the S side, which differentiate them from C on the B side. Part of or all users on the B side are then induced to own both C and C', provided that the cost of such “multi-homing” is small.<sup>15</sup>

Thus, unlike in a standard one-sided market, in a two-sided market in which the cost of multi-homing for users facing the tie is small, the tie on that side of the market need not preclude competitors from profitably competing even when competitors' technology is undifferentiated from the tied technology from their point of view.

Incidentally, a common and successful business model in two-sided markets consists in giving away the product (or even paying the consumer for using the product!<sup>16</sup>) to one side of the market, and covering costs by charging the other side. Such discrimination between the two sides, which helps attract the less eager side while allowing firms to make a profit or at least break even overall, can be observed in a variety of industries with or without market power: Traditionally, firms make little money or lose money on consoles (videogames), developer kits and support (software), cardholders (payment systems), and recoup on games, licensing of software to users, and merchants, respectively. Many software programs such as Acrobat PDF are free to readers, but not to writers. Portals, TV networks and newspapers are often free of charge or sold below cost to viewers and readers, but not to advertisers. Many dating agencies or night clubs also build their business model around such discrimination. These examples and others demonstrate that the existence of free (or even negative) prices on one side of the market need not be conducive to tipping, and is consistent with vibrant competition.

The recent economics literature<sup>17</sup> has analyzed the factors leading to such asymmetric price structure. And, quite importantly, it has emphasized that these business models may bring good social value for the same reason that they are profitable to firms: they enable platforms to get all sides on board, creating trade and economic value. In such markets, therefore, low or zero prices, and the tying phenomena that embody such implicit prices, are likely to be frequently observed, and often beneficial.

*Summing up.* As in the realm of market share definitions for the purpose of identifying dominant positions, it is useful to come up with measures of the percentage of the tied market that is affected by the tying. The rationale in both cases is to provide a screening device to competition authorities in order to alleviate their load. As in the case of market shares, the resulting numbers should be taken with a grain of salt. Besides the standard difficulty of

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<sup>15</sup> “Multi-homing” refers to consumers' connecting or belonging to multiple platforms. For example, merchants may accept Visa and American Express cards; conversely cardholders may have both cards in their wallets.

<sup>16</sup> Cardholders sometimes receive cash-back bonuses or frequent flyer miles for using their card.

<sup>17</sup> E.g., Ambrus-Argenziano (2004), Anderson-Coate (2003), Armstrong (2004), Gabszewicz-Wauthy (2004), and Rochet-Tirole (2003).

defining markets (in this context the tied market<sup>18</sup>), it is important to refine what is meant by "being affected". For example, does one take a usage or membership/ adoption viewpoint? Consider for example the case of a merchant who contemplates dropping payment card A because the merchant discount on card A is high, and accepting only card B. This merchant must primarily worry about whether owners of card A also hold card B, that is if there is membership multi-homing;<sup>19</sup> recent empirical work (Rysman 2004) shows that there is much more membership multi-homing than usage multi-homing.

A second, and familiar reason why no "magic number" can be expected to come out of such foreclosure measurement is that the relevant share depends on the impact of foreclosure, i.e., on the analysis of competitive effects (step 2).

Figure 4 summarizes the discussion in this section.

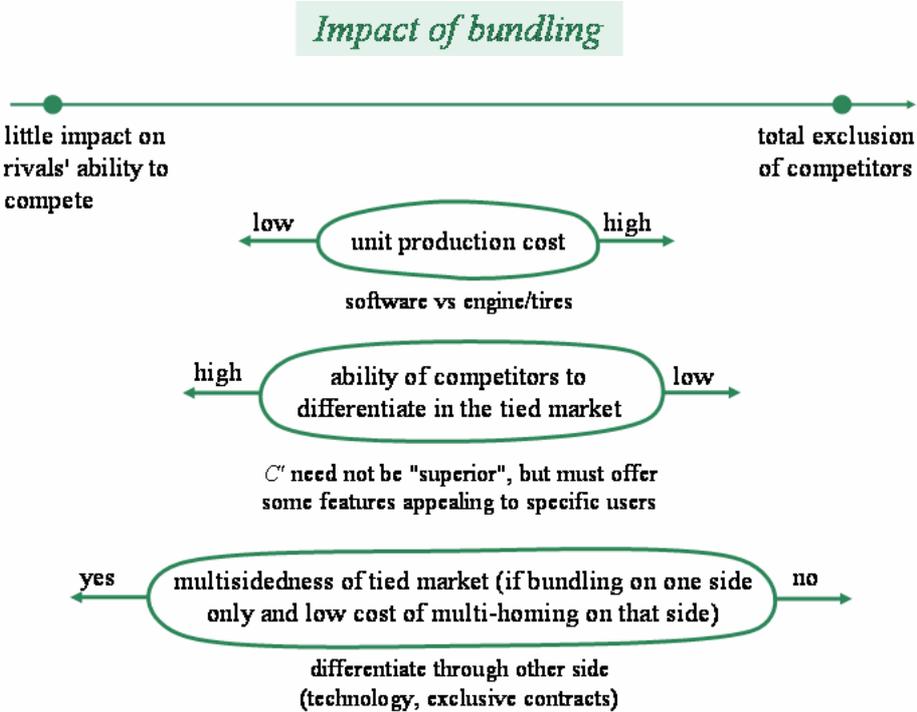


Figure 5

**4. Step 2: Is the tie likely to hurt consumers?**

Let us assume that the step-1 analysis led to the conclusion that the tie reduces competition in the tied segment. Even so, it may hurt or benefit consumers; the tie may or may not have anti-competitive rationales.

<sup>18</sup> For example, few would argue that the tie of Windows and WordPad affects/forecloses over 90% of the market for word-processing software.

<sup>19</sup> Things are a bit more complex if card A gives cash-back bonuses or frequent-flyer miles and cardholders know which cards are accepted before they choose their store: see Rochet-Tirole (2002, 2003).

## 4.1 Rationales other than anti-competitive ones

Let us first list rationales that are not related to anti-competitive motives. These include rationales clearly aimed at improving efficiency and others, such as price discrimination, that a priori have an ambiguous impact on welfare.

(a) *Distribution cost savings.* Peugeot and buyers of Peugeot bicycles both benefit from Peugeot's tie of the ring bell, saddle, brakes, and other equipments even though this tie forecloses rival equipment manufacturers' access to Peugeot bicycles. Similarly a three-star restaurant chef and her customers both benefit from the customers' inability to select among the pastries of all top pastry shops in the region. As Whinston (2001, p78) notes, it suffices to consider the effect of a rule mandating that all functions of Windows be available separately to understand why some integration of functionality is both desirable and inevitable. Tying is a ubiquitous feature of economic activities, simply because it economizes on transaction costs.

(b) *Compatibility cost savings.* Relatedly, it may be costly for the producer of the basic good (M) to achieve compatibility with competitors in all competitive segments. Airbus or Renault must ensure seamless interoperability between the various embedded systems, engines, brakes, and other equipments. Extending this interoperability to multiple outside vendors of these equipments requires fixing in advance, exposing and documenting a large number of interfaces. The transaction costs involved in ensuring compatibility range from minuscule (as for the compatibility between the saddle and the bicycle) to substantial. Their assessment is clearly case-specific and largely beyond the economist's expertise.

(c) *Information and liability considerations.* Tying is one way of telling consumers that a complementary good functions adequately with the basic good. To be certain, it is not the only way, as we can see from the widespread practice of endorsing complementary products "as recommended by M". More importantly, a tie may be used to protect M's reputation vis-à-vis consumers, or to insulate M against assignment of liability in a case of malfunctioning that is really due to wrong design by an independent producer. A tie can then be viewed as solving a problem of "moral hazard in teams" when third parties (such as consumers or the courts) do not have the technical expertise or the information necessary to know who is at fault.

(d) *Protection of intellectual property.* Achieving perfect compatibility may also require releasing proprietary information embodied in the design of the M product – such as information about "general-purpose functionalities" that naturally lie in product M rather than in the complementary product C. Suppose for example that Coca-Cola and rivals would like to produce a biscuit that tastes particularly good when consumed jointly with a Coke; and that in order to produce such biscuits one needs to know the ingredients in the Coke formula in order to match them well on the biscuit side. Creating a level playing field in the biscuit segment would require relinquishing the trade secret that made Coca-Cola successful. This contrived example makes a more general point, one that confronts antitrust authorities with a case-by-case technical challenge. They need to assemble factual knowledge as to whether the complementarities between the two segments can be exploited without an infringement on intellectual property.

(e) *Legitimate price response.* Low prices (even zero or negative ones) need not reflect anticompetitive intents in certain environments. We already mentioned the idea that a low price may boost demand in a complementary segment. A case in point is the strategy of giving

away the razor in order to sell razor blades. We also refer the reader to our previous discussion of two-sided markets, where we argued that it often makes good business sense – and, importantly, is socially efficient – to give away the product or service to one side of the market and to make money on the other side. Alternatively, penetration pricing may be used for a product with unknown quality in order to induce consumers to try it, or else, in order to build an installed base in a market with network externalities.

As we noted earlier, charging a low price for the competitive good is not very different from bundling the goods together, at least if the complementary good has little value unless used in combination with M. Hence, a tie may in some circumstances be viewed as a legitimate price response in a competitive environment.

*(f) Market segmentation.* A well-known rationale for tying is that a tie enables the metering of demand and prices to depend on consumer usage. Textbook examples of this rationale include IBM's tie of punched cards with computers, and equipment manufacturers' tie of after-market services.

When the basic good (M) is consumed in fixed amount while the complementary good (C)'s consumption varies across individuals, profit maximization, as well as often economic efficiency, requires that high-usage consumers be charged substantially more than low-usage ones. This pricing structure may not be feasible when the complementary segment is served by a competitive industry. A foreclosing tie enables the manufacturer of the basic good to meter demand and practice a potentially socially desirable segmentation of consumers.<sup>20</sup>

Relatedly, suppose that some consumers use M on a stand-alone basis while others use M in combination with C or C'. Under unbundling, the producer of M is forced to charge a single price for M even though the two groups' willingness to pay may be quite distinct. So for example, if consumers without demand for the complementary product have a low willingness to pay, the producer of M may end up charge a high price for M and prevent them from consuming. By contrast, a tie enables the producer of M to charge a low price for the basic good and a high price for the combination, which avoids excluding the first group and raises economic efficiency.

To be sure, price discrimination in general has an ambiguous impact on consumers, and putting price discrimination by a dominant firm in a “legitimate rationale” category would be bound to be controversial, especially in view of EU law that frowns upon the practice. The economic profession as a whole, though, has a more lenient attitude toward price discrimination than policymakers. A reasonable stance is a rule-of-reason treatment that demonstrates that the negative effects of price discrimination by a dominant firm are likely to dominate its benefits.

## 4.2 Anti-competitive rationales

The main impact of the tie and its potential exclusionary impact may be not so much to enhance efficiency as described above, but rather to hurt rival producers in the competitive market, thereby inducing their exit or discouraging their entry.

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<sup>20</sup> See Nalebuff (2003, part 1) for a discussion of welfare effects of price discrimination in a tying context.

To build a theory of anti-competitive tying, one must somehow explain why (a) tying benefits the integrated firm, and (b) tying hurts consumers. Simple elimination of competition will not do, for a well-known reason. Because the goods  $C$  and  $C'$  are complements to  $M$ , making the adjacent good less attractive to consumers, perhaps by eliminating competition or reducing innovation in that segment, lowers the price that the integrated firm can charge for  $M$ . In general, the integrated firm benefits from vigorous competition in the potentially competitive segment, not the reverse. This is actually why open platforms in videogame, hardware and software markets for instance have often taken over closed ones, for which adjacent segments are supplied in-house. This “Chicago school” argument, as it is often called, does not imply that firms with market power in one segment always long for competition in adjacent segments. Indeed, we have already seen that efficiency considerations may call against such competition. We now observe that anti-competitive motives may also be present. The main point of the basic Chicago school argument is that a simple-minded analysis that would stop at step 1 of the checklist would be misguided.

There are two reasons why the producer of  $M$  may want to engage in such anti-competitive behavior.<sup>21</sup> It may try to monopolize the competitive market; or it may want to protect its monopoly position in the monopoly segment.

(a) *Monopolizing the competitive segment.* Suppose now that there are two types of consumers:

- ✓ some consume the combination  $\{M, C \text{ or } C'\}$  and have no value for  $C$  or  $C'$  on a stand-alone basis,
- ✓ others consume the competitive good  $\{C \text{ or } C'\}$  on a stand-alone basis, and are uninterested in  $M$ .

By refusing to offer  $M$  on a stand-alone basis (or equivalently by selling it at a high price), the integrated firm excludes rival producers in the competitive market from access to consumers who demand the combination. This strategy directly hurts the integrated firm since the lack of consumer choice between  $C$  and  $C'$  (when combined with  $M$ ) reduces the consumers' willingness to pay for  $M$ . Here, exclusion is not motivated by any efficiency consideration.

The exclusionary strategy may however indirectly pay off for the integrated firm if, following the tie, the rivals' profit in the market for the consumers who demand only  $C$  or  $C'$  is no longer sufficient to cover their fixed costs of operation, and thus rivals exit the competitive market, allowing the integrated firm to monopolize that market as well.<sup>22,23</sup> In the parlance of predation analysis, the integrated firm sacrifices profit on consumers who consume both goods jointly and recoups this lost profit by charging more to consumers who demand solely the potentially competitive good.

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<sup>21</sup> Consistently with the object of our analysis, we here focus on anti-competitive rationales in the context of complementary products. A large literature, including Whinston (1990)'s seminal paper and Nalebuff (2004), has looked at broader contexts, in which tying reduces entrant profits in the tied market and thereby may deter entry, regardless of the existence of complementarities between the tying and the tied products.

<sup>22</sup> As Whinston (2001) notes, a variant of this argument involves dynamic network externalities in the competitive market:  $C'$  having no market today due to the tie may want to exit even if the tie will come to an end, since there will be little demand for  $C'$  tomorrow in the absence of an installed base.

<sup>23</sup> Under what conditions can the exclusionary strategy be profitable? Exclusion deprives the rivals from substantial profits if the rivals' offerings  $C'$  are sufficiently differentiated from  $C$  and if the number of consumers demanding the combination is large; on the other hand, these conditions also increase the integrated firm's direct cost of tying. See also the discussion in Whinston (1990).

(b) *Protecting the monopoly segment.* Alternatively, the integrated firm may be concerned about the possibility that a product competing with M will later enter the market. To the extent that the two goods are demanded in combination rather than on a stand-alone basis, entry in the M market may be somewhat discouraged by the absence of independent complementary products C'. Hence a strategy that encourages producers of C' to exit (or discourages them from entering) while lowering profit in the short run, may protect the monopoly segment and increase the integrated firm's long-run profitability.<sup>24</sup> This is the standard "applications barriers to entry" theory.<sup>25</sup>

Whether tying aims at monopolizing the competitive segment or at protecting the monopoly segment, the incriminated behavior is really predation rather than tying per se. The tie is just one strategy that is used to achieve predation and to induce exit or deter entry. This refocusing on predation has several implications. First, authorities should use the standard procedure for the analysis of predation.<sup>26</sup> Steps 1 and 2 would still figure prominently in the process; and the standard recoupment test can be added to the checklist: To the extent that the tying firm does not engage in tying for efficiency reasons and therefore makes its tying product less attractive to its consumers, does the prospect of future gains from successful predation offset the current losses?

## 5. Costs and benefits of a predation-based treatment

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<sup>24</sup>Carlton-Waldman (2002). See Choi-Stefanadis (2002) for a somewhat different approach (based on the idea that entry is risky and that entering in two markets simultaneously is riskier than entering a single one). This application barriers to entry theory holds for example if the producers of C' fail to anticipate entry in the M market (an hypothesis that is more plausible if there are many complementary markets affected by a tie with M, as there is then a coordination problem in which firms' entry decision are interrelated), and that entrants in the M market be unable or unwilling to supply their own offering in the complementary segment. The argument however does not rely on a lack of coordination: see next footnote. The welfare analysis is not straightforward; by assumption, anti-competitive theories presume large fixed costs in the competitive segment. Competition in that segment involves a social trade-off between low prices and product diversity on the one hand, and the duplication of these large fixed costs on the other hand.

<sup>25</sup> Some mathematics may help illustrate this point. Suppose for simplicity that consumers are homogenous and derive gross surpluses M, C, and C' from goods M, C and C' (when combined with M in the case of C and C'). The marginal costs of production are denoted m, c, and c'. Assume that C' dominates C in that it offers a better quality / cost package:

$$\Delta \equiv (C'-C) + (c-c') > 0$$

$\Delta$  measures the competitive advantage of C' over C. Suppose that there are two dates (today and tomorrow) and no discounting, and that an entrant can enter and produce C' already today at fixed R&D cost  $f_C$ . It can further introduce a perfect substitute M' for M tomorrow, at cost  $f_M$ . If

$$\Delta < f_C + f_M < 2 \Delta,$$

then a tie today deters entry in both markets, as it deprives the rival from today's profit in the C segment and makes the overall entry strategy a losing proposition. [A technical aside here: with the above specification of demands, there exist multiple price equilibria in the first period. I assume that the entrant appropriates the full comparative advantage  $\Delta$  in that period. The analysis however does not rest on this assumption.]

<sup>26</sup> In this respect, let us note the divide between Europe and the US with regards to the opportunity of a recoupment test. The European Court of Justice more or less argued in *Tetra Pak* that dominance implies an ability to recoup, and therefore that a recoupment test is not needed. In the US, the Supreme Court used a recoupment test in *Brooke Group*. See e.g., Vickers (2004) for a discussion of the intricacies associated with a recoupment test.

To be sure, my suggestion of discarding tying cases as such and reclassifying them as predatory cases has the advantage of refocusing and clarifying the economic analysis, but it has its own limitations, which are those inherent in the treatment of predation in general. First, there is the familiar, but difficult question of the allocation of the burden of proof. Antitrust authorities may not know whether an “apparently innocent conduct” (one that a priori benefits consumers, such as charging a low price, reducing production cost, or engaging in an efficient tie) is not also meant to induce rivals’ exit. Conversely, it may be hard for the defendant to prove that his action (here tying) is driven by efficiency rather than by predatory intent. Second, even if the competition authorities and the court had all the required information (a big “if”), their current mandate gives them insufficient guidance for treating predation cases. By analogy with price predation, one could identify non-price predation as a voluntary and temporary loss in profit that can be rationalized only through a contemplated and substantial increase in the rivals’ probability of exit and the subsequent ability to recoup losses.<sup>27</sup> This, up to informational requirements, defines an operational approach to treating non-price predation, although, as is discussed next, not one that is immune to criticism.

*Mixture of efficiency and anti-competitive rationales.*

We need to devote more attention to the following issue: Suppose that one is concerned that a lack of independent suppliers (of C’) in the adjacent markets will by itself perpetuate M’s monopoly position. Should policymakers impose lines of business restrictions preventing M from entering specific adjacent segments, a policy that would require defining such segments and rigidifying the platform? Or, more realistically, should they take steps to prevent the integrated firm from dominating the adjacent markets? If so, what steps? The integrated firm may end up dominating an adjacent market for reasons unrelated to anti-competitive intents: efficiency, innovation, or mere discouragement of rivals, who under pressure from even an inferior offering of the integrated firm cannot secure margins sufficiently in excess of marginal cost to cover their fixed cost. Increased efficiency by the integrated firm may indeed have the potential to eliminate rivals, all the more so in markets with large fixed costs and/or prone to tipping.

Thus, a complex situation arises when the incriminated behavior is driven both by efficiency and anti-competitive rationales. With tying as for other corporate strategies, a behavior that excludes rivals may actually be optimal for the dominant firm even taking rivals’ actions as given. Put differently, predation does not always imply a cost for the predator; yet, the efficiency gains may be more than offset by the increase in future monopoly power from a social perspective. The possibility of “no-cost predation” (an oxymoron according to the current legal treatment of predation, which emphasizes the existence of a profit sacrifice to drive out rivals) poses a general and complex challenge to antitrust enforcers. Weighing the two opposite effects is a “tough call”. On the one hand, one may be worried that too many anti-competitive moves would pass muster with a rule that finds such mixed-rationales moves innocent. On the other hand, firms should have no duty to be inefficient just in order to maintain their rivals alive; such a duty would for example often prevent dominant firms from improving their productivity, or would force them to charge high prices to consumers so as to provide a price umbrella to their rivals. It is easy to envision the potential perverse effects of such an approach in the absence of clear guidance on how to run it.

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<sup>27</sup> Furthermore, and as Vickers (2004) argues in a broader context, anchoring case analysis in economic principle (what he calls “economics-based law”) may provide more legal certainty than “form-based law”.

### *The sacrifice test, special responsibility, and no-cost predation*

A little algebra may clarify the issues. Suppose that there are two periods: “today” and “tomorrow” (discounted at discount factor  $\delta$ ). Let  $\pi(a)$  denote the dominant firm's current profit, where  $a$  is a current action indexed by its “aggressiveness”. Suppose that  $\pi$  is concave, with a maximum at  $a^*$ :  $\pi'(a^*)=0$ . Let  $\pi^m$  and  $\pi^d$  denote the dominant firm's profit tomorrow if the rival exits or stays, respectively ( $\pi^m > \pi^d$ ), and let  $x(a)$ , an increasing function, denote the probability of exit. Suppose, in a first step, that  $\pi^m$  and  $\pi^d$  do not depend on  $a$  (no hysteresis). For example  $a$  might stand for a price cut. Per se, it has no long-term impact conditional on the rival either staying or exiting the market; but it may drive a financially weak rival out of the market. Accounting for strategic interactions, the (overall) profit-maximizing strategy solves:  $\max \{ \pi(a) + \delta[x(a)\pi^m + [1-x(a)]\pi^d] \}$ , yielding  $\pi'(a) = \delta x'(a)(\pi^m - \pi^d)$ , and hence  $a > a^*$ . In such circumstances, the dominant firm is naturally tempted to pick an action at least a bit more aggressive than what would be justified by short-run profit maximization. By contrast, theory suggests that, provided that competition has social benefits, the dominant firm should select  $a < a^*$  (see Vickers (2004) for a discussion). Thus, both the private and the social incentives call for a sacrifice of short-term profit, but in opposite directions in terms of their impact on future competition. This raises the issue of the extent of a dominant firm's “special responsibility” not to distort competition.

We can also use this reasoning to illustrate the implications of “no-cost predation” (or what Bain 1956 called “blockaded entry”). Assume that short-term profit maximization ( $a=a^*$ ) triggers exit ( $x(a^*)=0$ ). There is then no predation according to the standard definition; yet there is exclusion. Should the firm “bend over backward” and choose a suboptimal action (provided it is not too costly) in order to keep competition alive? In theory, the answer could well be “yes”, but in practice, given the information available to courts, conferring on dominant firms a “duty to create their own competition” would be a hazardous policy.

Second, suppose that the action has long-term consequences other than the rivals' exit decision:  $\pi^m$  and  $\pi^d$  depend on  $a$  (the tie may be technological and long lasting; the dominant firm may have built goodwill or entered long-term contracts; and so forth). Suppose even that it has no short-term impact on profit. The incumbent then maximizes

$$\pi + \delta [x(a)\pi^m(a) + [1-x(a)]\pi^d(a)].$$

It is now harder to design a sacrifice test. One natural candidate is the absence of sacrifice taking the rival's exit behavior  $x$  as given. That is, one may ask whether  $a$  maximizes the dominant firm's *intertemporal* profit when the latter behave non-strategically with regards to the rival's exit behavior. This definition, however, is plagued by the possibility of self-fulfilling prophecies. Assume that  $\pi^d$  decreases with  $a$ , but  $\pi^m$  may increase or not be affected by  $a$  (this is the case in some simple versions of Whinston (1990)'s tying model or when  $a$  stands for “overinvestment”). Then, the optimal policy depends on whether the rival exits. An aggressive policy does not sacrifice profit ( $\pi^m$ ) if it triggers exit; and a softer action maximizes the profit ( $\pi^d$ ) under duopoly. Long-term direct impacts of the predatory action on profits raise the issue of the reference profit. To put it more formally, let  $a^m$  maximize  $\pi^m(a)$  and  $a^d$  maximize  $\pi^d(a)$ , and suppose that  $x(a^m)=1$  and  $x(a^d)=0$ . Then both  $a^m$  and  $a^d$  satisfy the no-sacrifice test.

### *Pass on and balancing tests.*

A different issue arises as to how one should weigh profits and consumer surplus when trading off efficiency gains and reductions in competition. Economists often add these two variables in order to measure “total welfare”. Antitrust enforcers by contrast traditionally focus on consumer welfare. For example, the interpretation of Article 81(3) in Europe<sup>28</sup> has led practitioners to envision a “pass on test” and a “balancing test”. In short, some of the efficiency gain must be passed on to consumers and the latter's benefit must outweigh the loss from competition. It therefore lies in the tradition of focusing on the impact of the practice on consumer surplus.

There are arguments either way. On the one hand, one may for redistribution reasons legitimately feel that consumers weigh more than shareholders, who usually belong to much higher income brackets. The argument is however not as straightforward as it looks. First, there is the usual question about whether redistribution is not best performed through income taxation rather than through specific instruments.<sup>29</sup> Second, consumers are often shareholders as well, especially in countries with well-developed pension funds.

One can also argue that, by properly choosing the horizon of analysis, counting profits is, in some circumstances, akin to accounting for consumer surplus. This point of view is actually implicit in a number of branches of law. It underlies much of intellectual property law, which explicitly allows intellectual property owners to (*ex post*) engage in a variety of foreclosure and anti-competitive moves, the reasoning being that from an *ex ante* point of view this leniency creates incentives for innovation and ultimately benefits consumers. Similarly, antitrust acceptance of prices largely in excess of marginal cost<sup>30</sup> reflects the generally accepted view that such margins are what it takes to encourage investments in industries with large fixed costs.

### *Measuring loss.*

Simplifying somewhat, tying can be viewed as charging a zero price for the tied product. While antitrust analysis usually compares price to some notion of marginal cost,<sup>31</sup> it is also well-known that this comparison is theoretically problematic. Namely, the proper benchmark may lie below or above marginal costs. In the absence of predatory intent, firms may charge below marginal cost for several reasons: penetration pricing when the quality is unknown to consumers, leaning-by-doing (current sales reduce future costs), multi-sidedness (a loss on one side boosts volume and thereby demand on the other side of the market: see section 3) or more generally network externalities. Conversely, a price above marginal cost,

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<sup>28</sup> This article opens the door to exempting a practice “which contributes to improving the production or distribution of goods or to promoting technical or economic progress, while allowing consumers a fair share of the resulting benefit, and which does not:

(a) impose on the undertakings concerned restrictions which are not indispensable to the attainment of these objectives;

(b) afford such undertakings the possibility of eliminating competition in respect of a substantial part of the products in question.”

<sup>29</sup> See the large literature following the Atkinson-Stiglitz (1976) theorem stating conditions under which redistribution should be conducted solely through income taxation.

<sup>30</sup> In Europe, though, excessive pricing can in principle breach competition law. But as Vickers (2004) notes, “nearly all European cases have concerned exclusionary, rather than directly exploitative, conduct.”

<sup>31</sup> See Brodley et al (2000) for a discussion of the relevant concept of “marginal cost”.

but below the short-term profit maximizing price may suffice to induce rivals to exit (or deter them from entering).

## **6. Concluding comments**

### **6.1 Step 3: Remedies**

Suppose, last, that one comes to the conclusion that the tie is likely to eliminate competition (step 1) and that its rationale is anticompetitive (step 2). Then comes the complex step of finding a proper remedy. The anti-competitive tying theories, and in particular the theory stressing an applications barriers to entry, suggest that antitrust authorities ought to intervene in order to maintain active competition in components (i.e. to keep C' alive).

As argued above, the anti-competitive harm, if any, comes from a predatory act, not from tying per se. Like low prices, ties may be perfectly legitimate strategies, even for dominant firms; it is only to the extent that they are turned into predatory tools that they become a concern. Consequently, the remedy has to be considered in its broader context. Suppose that tying is the least-cost instrument of predation for the dominant firm. Its prohibition may well induce the dominant firm to resort to other forms of predation than are both privately and socially more costly. For example, it may try to degrade interconnectivity with its rivals in the tied market, promote its version of the tied product in inefficient ways, or, in a two-sided market, enter on the other side into exclusive contracts that are unrelated to efficiency considerations. This remark further emphasizes the limits of treating tying cases as such.

### **6.2 System versus component competition.**

Given that competition policy officials, however talented and well-meaning, will always face substantial imperfections in information, many economists feel that encouraging system competition, when feasible, is a superior alternative to the regulation of component competition. That is, it may be better to encourage some competition in the M segment than to accept monopoly there and attempt to regulate the consequences in the C segment. This diffidence vis-à-vis the regulation of component competition also underlies much of public policy in concentrated industries. Increasing returns to scale and/or network externalities limit the number of relevant actors in a number of industries: There are currently two commercial aircraft manufacturers in the world, in many locations a single provider of local loop telecommunication infrastructure or in many rural areas a single supermarket. Public policy has not sought to unbundle space on Walmart shelves or the equipment in Airbus and Boeing aircraft. There is a continuing debate between the proponents of a fine unbundling of the local loop and those in favor of a wholesale rental of the local loop to alternative telecommunications operators.

These policies are predicated on the view that detailed and intrusive regulation is likely to do as much harm as good under poor regulatory information, and that system competition, or at least system contestability (the ability of entrants to enter if the incumbent monopoly fails to innovate and/or abuses his monopoly position) is a superior alternative

when available. They also reflect the fact that, contrary to what is sometimes believed, system competition does not necessarily restrict the set of options offered to consumers compared with component competition. The benefits from bundling, or equivalently the costs attached to unbundling, imply that some combinations available under system competition would be either unavailable or available at a significantly higher price under component competition, for the same reason that made-to-measure clothes typically cost much more than those available off-the-peg.

The caveat to this view is precisely the applications barriers to entry argument pointing out that system contestability may require vibrant competition in at least some key components. The debate is therefore an industry-specific, empirical one: To what extent is the exit – or lack of entry – of rival component manufacturers conducive to a loss of expertise by the component industry outside the integrated firm?

### **6.3 Summing up**

A brief summary of the arguments made in this primer goes as follows:

- The impact of tying on competition in the tied market ranges from “little impact on the rivals’ ability to compete” to “total exclusion of competitors”. Where it stands in that range depends on a number of factors: the marginal cost of manufacturing the tied product; the rivals’ ability to differentiate horizontally or vertically their offering from the tied product (that is, to offer some features that are not available in the tied product); and, if the market is multi-sided, the ability to differentiate, in the side where there is no tie, through technological features, in-house supply, or exclusive contracts with third-party vendors, and the ease with which users on the tying side can multi-home.
- Tying should be submitted to a rule-of-reason standard. Firms with market power may engage in a tie in order either to monopolize the competitive segment or to protect their monopoly power in the monopoly segment. But, like firms without substantial market power, they also use ties for a variety of reasons that enhance economic efficiency (distribution or compatibility cost savings, accountability, protection of intellectual property, legitimate price responses), or at worst have ambiguous effects on social welfare (price discrimination).
- It is hard to think of reasons why tying should be considered a separate offense. Like many other corporate strategies that make one’s products attractive to consumers, tying has the potential of hurting competitors, and therefore is just one in a large range of strategies that can be employed to prey on competitors. Competition policy therefore should analyze tying cases through the more general lens of a predation test.

## References

- Armstrong, M. (2004) "Competition in Two-Sided Markets," mimeo, University College, London.
- Ambrus, A., and R. Argenziano (2004) "Network Markets and Consumers Coordination," mimeo, Harvard University, Yale University.
- Anderson, S., and S. Coate (2003) "Market Provision of Broadcasting: A Welfare Analysis," forthcoming *Review of Economic Studies*.
- AT&T vs. MCI (1982) 708F.2d 1081, 11 32-33 (7<sup>th</sup> Cir), cert. Denied, 464 US891
- Atkinson, A.B., and J. Stiglitz (1976) "The Design of Tax Structure: Direct and Indirect Taxation," *Journal of Public Economics*, 6: 55-75.
- Bain, J. (1956) *Industrial Organization*, New York: Wiley.
- Bolton, P., J. Brodley, and M. Riordan (2000) "A Predatory Pricing: Strategic Theory and Legal Policy," *Georgetown Law Journal*, 88(8): 2239-2330.
- Carlton, D., and M. Waldman (2002) "The Strategic Use of Tying to Preserve and Create Market Power in Evolving Industries," *Rand Journal of Economics*, 33(2): pp. 194-220
- Choi, J.P., and C. Stefanadis (2001) "Tying, Investment, and the Dynamic Leverage Theory," *Rand Journal of Economics*, 32: 52-71.
- Deneckere, R., and P. McAfee (1996) "Damaged Goods," *Journal of Economics and Management Strategy*, 5(2): 149-174.
- Evans, D., and M. Salinger (2004) "Why do Firms Bundle and Tie? Evidence from Competitive Markets and Implications for Tying Law," forthcoming, *Yale Journal of Regulation*.
- Evans, D., Hagiu, A., and R. Schmalensee (2004) "A Survey of the Economic Role of Software Platforms in Computer-Based Industries," CES IFO working paper, September.
- Evans, D.S., Padilla, J., and C Ahlborn (2004) "The Antitrust Economics of Tying: A Farewell to Per se Illegality," *Antitrust Bulletin*, 49(1-2): 287-341.
- Farrell, J., and M. Katz (2000) "Innovation, Rent Extraction, and Integration in System Markets," *Journal of Industrial Economics*, 48 (4):413-432.
- Gabszewicz, J., and X. Wauthy (2004) "Two-Sided Markets and Price Competition with Multi-homing," mimeo, Université Catholique de Louvain.
- Gans, J., and S. King (2004) "Competitive Neutrality in Access Pricing," mimeo, University of Melbourne.
- Laffont J-J. and J. Tirole (1994) "Access Pricing and Competition," *European Economic Review*, 38:1673-1710
- (1996) "Creating Competition Through Interconnection: Theory and Practice," *Journal of Regulatory Economics*, 10: 227- 256.
- Nalebuff, B. (2003) "Bundling, Tying, and Portfolio Effects, Parts 1 and 2," Department of Trade and Industry economics paper 1.
- (2004) "Bundling as an Entry Deterrent Device," *Quarterly Journal of Economics*, 119(1): 159, 188.

Rey, P., and J. Tirole (2003) “A Primer on Foreclosure,” forthcoming in M. Armstrong and R.H. Porter, eds., *Handbook of Industrial Organization* .

Rysman, M. (2004) “An Empirical Analysis of Payment Card Usage,” mimeo, Boston University.

Rochet, J.C., and J. Tirole (2002) “Cooperation Among Competitors: Some Economics of Payment Card Associations,” *Rand Journal of Economics*, 33(4): 1-22.

—— (2003) “Platform Competition in Two-Sided Markets,” *Journal of the European Economic Association*, 1(4): 990– 1029.

—— (2004) “Two-Sided Markets: An Overview,” mimeo.

Tirole, J. (1988) *The Theory of Industrial Organization*, MIT Press.

Vickers, J. (2004) “Abuse of Market Power,” speech to 31<sup>st</sup> EARIE conference (Berlin, September 3).

Whinston, M. (1990) “Tying, Foreclosure, and Exclusion,” *American Economic Review* 80: 837–859.

—— (2001) “Exclusivity and Tying in *U.S. vs Microsoft*: What we Know, and Don't Know,” *Journal of Economic Perspectives*, 15(2): 63–80.