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### *On the Use of Price-cost Tests in Loyalty Discounts: Which Implications from Economic Theory?*

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# *On the Use of Price-cost Tests in Loyalty Discounts: Which Implications from Economic Theory?*

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### **Abstract**

Recent cases in the US (Meritor, Eisai) and in the EU (Intel) have revived the debate on the use of price-cost tests in loyalty discount cases. We draw on existing recent economic theories of exclusion and develop new formal material to argue that economics alone does not justify applying a price-cost test to predation but not to loyalty discounts. Still, the latter contain features (they reference rivals and allow to discriminate across buyers and/or units bought) that have a higher exclusionary potential than the former, and this may well warrant closer scrutiny and more severe treatment from antitrust agencies and courts.

**Keywords:** Market-share discounts, Inefficient foreclosure, Exclusive dealing

**JEL Classification:** K21, L41

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## 1 Introduction

There has recently been a lot of discussions, both in the US and in Europe, about the desirability of using price-cost tests when dealing with *loyalty discounts*, defined as discounts (which can take different nature and form) given by a supplier to the buyer if the latter satisfies at least a certain percentage of its requirement from that supplier, or if its orders grow over time according to a certain percentage. Such discounts (or *rebates*) are denoted in different ways by different commentators, agencies, and judges, and may also be called, among others, *exclusivity discounts*, *market share discounts*, and *fidelity discounts*.

This discussion has been motivated by recent cases, such as *Eaton v. Meritor* in the US and the recent *Intel* judgment in Europe,<sup>1</sup> which raise the issue of how to evaluate the potential anticompetitive nature of these practices.

The Courts in both cases concluded that loyalty rebates represented an infringement and that a firm might be found violating the law even if prices are above costs. However, as we shall explain later, whereas the US Court of Appeal applies an effects-based approach, the EU's General Court relies on a form-based approach in which there is no room for economic considerations and the analysis of the effects. We will describe and comment upon these cases in Section 2.

The objective of this paper is to rely on recent theories of exclusion to answer the question of whether the price-cost test is dispositive in loyalty rebates cases. Some economists argue that the price-cost test is suitable for predation but not for exclusive dealing (and by extension for loyalty rebates that are considered very similar to exclusive dealing) on the basis that (a) these practices are supposedly rationalised by different theories and that (b) whereas in case of predation a sacrifice of profits is needed, in case of exclusive dealing (and by extension loyalty rebates) it would not be needed.

We submit in Section 3 that (a) there is often a common mechanism behind such different practices as exclusive dealing, rebates and predation; and (b) as soon as the incumbent and the rival compete for buyers, profits sacrifice is as needed in exclusive dealing (and therefore loyalty rebates) models as in predation. Our conclusion from the theory is that below-cost sales is not what distinguishes theories of predation from theories of exclusion through exclusive dealing (or loyalty rebates).

Nonetheless economic theory does not necessarily indicate that predation, loyalty rebates and exclusive dealing should all be treated in the same way. In Section 4 we review economic models which suggest that rebates and contracts conditioned on how much the buyer purchases from rivals raise serious anti-competitive concerns. From this point of view, a stricter treatment of exclusive contracts as well as loyalty discounts might be justified. In this perspective one may rationalise that evidence of above-cost prices represents a safe harbour for predation but does not for exclusive dealing and loyalty rebates. We elaborate on this issue in Section 5 which also concludes the paper.

## 2 Recent case-law

In this section, we briefly report on recent cases in the US and in the EU which have revived the debate on the treatment of loyalty discounts, and in particular on the role that price-cost tests should play when these practices are at issue. As we shall explain, two high-profile cases, *Meritor* in the US and *Intel* in the EU, appear at first sight to take a similar approach since both judgments state that above-cost prices does not spare the dominant firm from a finding of antitrust infringement. Yet, whereas the US Appeals Court (3rd Circuit) judges apply a rule of reason where economic analysis and effects-based considerations play a crucial

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<sup>1</sup>Similar issues also are raised in *Post Danmark II*, a case (referred to it by a Danish court) currently under the review of Europe's Court of Justice.

role, the EU General Court judges use a very formalistic approach where the mere finding that a dominant firm uses a market-share discount (called "exclusivity rebate") is sufficient to determine that it has abused of a dominant position.

The abovementioned judgments have not said the last word on the treatment of loyalty discounts. Rather, the case-law on both sides of the Atlantic is still very much in a flux. In the US, the Supreme Court has decided not to review *Meritor*, and we shall briefly see how a case (*Eisai v. Sanofi-Aventis*) with very similar features as *Meritor* has been interpreted in a different way by a District Court which also belongs to the 3rd Circuit. In the EU, Intel has appealed the General Court judgment; additionally, the Court of Justice is also expected to rule on another case, *Post Danmark II*, with related characteristics. This makes it particularly important to understand how to deal with loyalty discounts and more generally exclusionary practices involving price discrimination.

**ZF Meritor vs. Eaton.**<sup>2</sup> This case concerns the heavy-duty truck transmission market in North America. The market had been dominated by Eaton from 1950 to 1989, when Meritor entered and achieved, by 1999, a market share of 17%. At that point Meritor decided to form a joint venture with a German company, ZF, with the aim of introducing a new (two-pedal automated mechanical) transmission into the North American market by 2001. That type of transmission was used exclusively in Europe at that moment. In 2000 Eaton entered new long-term agreements (LTAs) – lasting five years – with each of the four Manufacturers of HD trucks (OEMs), the direct purchasers of HD transmissions.

The LTAs included rebates conditioned on the OEM purchasing at least a percentage of its requirements from Eaton. The percentage varied across OEMs and ranged from 68% to 95%. In some cases Eaton also agreed to make an up-front payment to the OEM entering the agreement. Each LTA also required the OEM to grant preferential treatment for Eaton in the OEM's *data book*<sup>3</sup> and, in two cases, to remove Meritor's products from the data book.

Following these facts, by 2003 Meritor's market share fell below 8%. The joint venture with ZF was dissolved and, by the end of 2005, Meritor's share dropped further to 4%. In January 2007 Meritor exited the business.

Meritor filed suit against Eaton and, in 2009, the US District Court found that Eaton's LTAs foreclosed a substantial part of the market, thereby harming competition. Eaton filed a renewed motion for judgment or for a new trial. Its claim was that Meritor had failed to establish that Eaton's conduct was anti-competitive because in all the time relevant to the case Eaton never priced below its costs. The case reached the US Court of Appeals for the 3rd Circuit which upheld the District Court judgment that Eaton's LTAs were anticompetitive.

The argument of the Appeal Court is that in this case *price is not the vehicle of exclusion*. As a consequence, *evidence that prices were above costs does not make the arrangements lawful*. The Court explains that:

"[...] this is not a case in which the defendant's low price was the clear driving force behind the customer's compliance with purchase targets, and the customers were free to walk away if a competitor offered a better price." (Meritor, p.37)

The reason is that:

"[...] compliance with the market penetration targets was mandatory because failing to meet such targets would jeopardize the OEMs' relationship with the dominant manufacturer of transmissions." (Meritor, p. 38)

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<sup>2</sup>US Court of Appeals for the Third Circuit. Nos.11-3301 and 11-3426. ZF Meritor vs. Eaton. June 26, 2012.

<sup>3</sup>Truck buyers have the ability to select many of the components used in their trucks, including the transmissions, from the OEM catalogue, denoted as *data book*.

As one OEM executive testified, if the targets were not met the OEMs

"would have a big risk of cancellation of the contract, price increases and shortage of supply." (Meritor, p. 37)

However, breaking the relationship with Eaton was a risk that OEMs could not afford: the reason is that Meritor did not sell the complete range of transmissions needed by OEMs which made Eaton an unavoidable trading partners.

"Eaton was a monopolist in the HD transmissions market, and even if an OEM decided to forgo the rebates and purchase a significant portion of its requirements from another supplier, there would still have been a significant demand from truck buyers for Eaton products. Therefore, losing Eaton as a supplier was not an option." (Meritor, p.37)

In other words, the fact that not all demand was contestable combined with the threat not to supply the OEMs is central to the finding that Eaton's conduct did not rely mainly on pricing.

As a consequence, the Court decided to adopt a *rule of reason* approach and assessed the anticompetitive effect of Eaton's conduct by looking, *inter alia*, at whether the extent of Eaton's market power was significant, at the existence of high entry barriers in the HD transmission market, at the rival's evolution of market share, at the duration of the agreements, at their coverage, and at the extent to which they could be terminated, as well as at other provisions contained in the agreements. Moreover, the Court considered whether there were possible procompetitive justifications for the agreements.

The decision was not unanimous. In his dissenting opinion Judge Greenberg argued, *inter alia*, that the Supreme Court's

"unwavering adherence to the general principle that above-cost pricing practices are not anticompetitive and its justifications for that position lead me to conclude that this principle is a cornerstone of antitrust jurisprudence that applies regardless of whether the plaintiff focuses its claim on the price or non-price aspects of the defendant's pricing program." (Dissenting opinion, p. 20)

Similar criticism is also echoed in an 'Amici curiae' brief by a number of US competition experts who (unsuccessfully) urged the Supreme Court to reverse the 3rd Circuit's judgment,<sup>4</sup> whereas other authors have defended the idea that loyalty discounts should not be submitted to the same standard as predatory pricing cases and should be considered instead as similar to exclusive dealing.<sup>5</sup>

Judge Greenberg argued that prices were indeed central to the LTAs:

"Eaton's prices were the crux of the rebate program and an inextricable element of the LTAs." (Dissenting opinion, p. 40) "LTAs themselves would not exist without the reduced prices that Eaton offered as an incentive for the OEMs to enter the agreements." (Dissenting opinion, p. 42)

Low prices, then, attracted buyers into LTAs whereas, according to the dissenting judge,

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<sup>4</sup>Daniel A. Crane et al. "Brief for eighteen scholars as Amici Curiae in support of petitioner", March 28, 2013.

<sup>5</sup>See Joshua D. Wright (2013) "Simple but Wrong or Complex but More Accurate? The Case for an Exclusive Dealing-Based Approach to Evaluating Loyalty Discounts". Speech delivered at the Bates White 10th Annual Antitrust Conference, Washington, DC on June 3, 2013. See also the following heated debate in the blog [www.truthonthemarket.org](http://www.truthonthemarket.org), containing a number of interesting contributions by authors such as Crane, Lambert, Salop and others.

”[...] there was no convincing evidence in the record suggesting that Eaton would have refused to supply transmissions to the OEMs had the OEMs failed to meet the LTA’s market-share targets or that Eaton at any point coerced the OEMs into entering the LTAs or meeting the targets.”<sup>6</sup> (Dissenting opinion, p. 22)

The conclusion of Judge Greenberg is, therefore, that Meritor’s decreasing market share and ultimate exit from the market were due to business failures – such as inability to develop a full range of products, a key source of competitive advantage in this market, and inability to offer appealing price conditions – rather than to Eaton’s practices.

**Eisai v. Sanofi-Aventis**<sup>7</sup> This case concerns a market for drugs, more precisely the relevant market is defined as the market for ”brand-name anticoagulants”. Sanofi’s Lovenox has between 81.5% and 92.3% of the market in the relevant period, and the other main drugs are Eisai’s Fragmin, as well as Glaxo’s Arixtra and LEO Pharma’s Innohep. Under scrutiny of the judge is the Lovenox Program, which consisted of a system of discounts based on both volumes and market shares. Similar to *Meritor*, here it was also undisputed that Sanofi’s price (after discounts) was well above costs: indeed, it was estimated to be 17.7 times its costs.

However, the judge here finds in favour of the defendant, and she claims that - unlike *Meritor* - here pricing was central to the practice, and hence the fact that price was above cost would be sufficient to dismiss the case. Crucial to the case are the accessory clauses: in particular, the judge stresses that the contracts between the hospitals and Sanofi were terminable on both sides at 30 days notice (in *Meritor*, Eaton had the right of terminating the contract if the targets were not met); and that hospitals were required not to advantage rivals, rather than discriminate against them (in *Meritor*, the OEMs were obliged to give preference to Eaton in their data book, or even removing rivals from it, and Eaton’s products were to be prices below rivals’).

Given that in her view *Meritor* does not apply, and that pricing is central, the finding that price is above costs would be enough to dismiss the case, but the district judge finds that even under a rule of reason approach the finding would be one of no violation, among other things because of the absence of customers’ testimony of foreclosure, because the market shares of Fragmin and Arixtra had increased over the period (implying absence of effects on rivals), and that hospitals could walk away from Lovenox without consequences (in other words, the aggressiveness of Sanofi’s salesforce and their threats were not credible).

Interestingly, the judgment does acknowledge that a portion of the demand could have not been contested by the smaller Eisai, but it argues that Eisai could have competed much more fiercely:

”Any alleged incontestable demand did not prevent Eisai from reducing its 85% profit margins to [...] increase its market share. [...] It may well be that Sanofi had even larger profit margins. In 2009, for example, Sanofi was able to charge a price that was 17.7 times higher than its costs, while Eisai charged 7.8 times its cost (...). But the antitrust laws do not protect businesses from the loss of profits due to vigorous competition.” (*Eisai*, p.13 of 19)

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<sup>6</sup>This is a delicate issue. The mere threat to stop or limit supply is indeed not credible: once the targets are not met the dominant firm has all the incentive to supply the non-contestable part of the demand. Hence, such all-or-nothing clauses facilitate a dominant firm in inducing buyers to accept exclusivity provided that the firm managed to build up a reputation of enforcing the threat. The existence of such a reputation is a condition that should be carefully checked. See *United States v. Dentsply Int'l, Inc.*, 399 F.3d 181, 191 (3d Cir. 2005).

<sup>7</sup>*Eisai INC. v. Sanofi-Aventis, LLC, et al.; District Court of New Jersey, March 28, 2014. Civil Action No. 08-4168.*

These considerations echo Judge Greenberg's arguments that Meritor was not an as-efficient competitor to Eaton and that a finding of monopolisation in circumstances in which the dominant firm charges in excess of its costs would protect rivals which would not deserve it, and hence reduce competition in the market.

**Intel v. EC. Case COMP/37.990** In Europe, the recent General Court (GC)'s *Intel* judgment is also mostly about loyalty rebates.

Intel is the leading global supplier of microprocessors, or central processing units (CPUs, i.e. the brain of a computer) for the x86 architecture. The CPU is the most expensive item within the total cost of a computer; it determines by and large the computer's performance.

CPUs are purchased by original equipment manufacturers (OEMs), who then integrate them into desktops, laptops or servers. OEMs then sell these final products to end-users, either directly or via retailers. The geographic scope of the market in the decision was worldwide. Intel had a market share in excess of 70% over the period of the abuse, which was found to occur from October 2002 to December 2007. AMD has been Intel's only significant competitor in this market since 2000. The industry is characterised by extremely high barriers to entry and expansion, due to investment in *R&D* and production facilities and to the costs related to intellectual property.

The contested abuses concerned, first, conditional rebates to four major OEMs. These were granted provided the OEMs sourced a minimum share of their x86 CPU requirements from Intel (80% for NEC, 95% for HP and 100% in the case of Dell and Lenovo). Intel had also offered Media-Saturn-Holding (MSH, Europe's largest PC retailer) payments conditional on it only stocking Intel-based PCs, for over 10 years. "Naked restrictions" represented instead the second abuse: Intel was found to have paid customers (OEMs) in return for the cancelling or delaying the launch of new AMD-based products.

In 2009 the European Commission found that Intel's rebates and payments diminished AMD's ability to compete on the merits and imposed a fine of 1.06 billion euros. Interestingly, after stating that under the existing case-law it was not necessary to prove that Intel's rebates entailed below-cost pricing, the Commission had gone at great length to show that Intel's rebates failed the as-efficient competitor test, which is nothing else than the price-cost test adapted to the case in which only a part of the demand can be contested by the dominant firm's rival. This was also in accordance with the Commission's own Guidance Paper which, although adopted following the start of the Intel's investigation and therefore not prescriptive in this case, was meant to inform the Commission's Article 102's policy on abuse of dominant position, and indicated that above-cost rebates would generally not be illegal.<sup>8</sup>

In 2014, the GC's judgment instead brushes aside the as-efficient competitor analysis of the Commission, deeming it irrelevant for cases of loyalty discounts (called by the GC "exclusivity rebates"). Additionally, the GC argues that no economic analysis is needed to establish violation, thereby *de facto* making loyalty rebates by a firm holding a dominant position *per se* illegal.

More precisely, the GC distinguishes three types of rebates:

First, quantity rebates which are linked solely to the volume of purchases and which are generally considered lawful insofar as they reflect economies of scale made by the supplier.<sup>9</sup>

<sup>8</sup>"Guidance on the Commission's enforcement priorities in applying Article 82 of the EC Treaty to abusive exclusionary conduct by dominant undertakings", C(2009) 864 final.

<sup>9</sup>See *Intel*, para. 75. The text of the judgment, as well as its reference to a paragraph of the *Michelin II* case which is not illuminating, is unclear as to what types of quantity rebates are covered in this category. However, our reading of *Michelin II* is that the Court would find quantity rebates justified when they reflect efficiencies at the level of a particular transaction. We doubt that the Intel judges would be ready to accept as lawful discounts awarded by a dominant company to a buyer which has met a certain threshold of purchases in a given period of time after several transactions.

Second,

"rebates the grant of which is conditional on the customer's obtaining all or most of its requirements from the undertaking in a dominant position. Such exclusivity rebates, when applied by an undertaking in a dominant position, are incompatible with the objective of undistorted competition within the common market, because they are not based — save in exceptional circumstances — on an economic transaction which justifies this burden or benefit but are designed to remove or restrict the purchaser's freedom to choose his sources of supply and to deny other producers access to the market [...]. Such rebates are designed, through the grant of a financial advantage, to prevent customers from obtaining their supplies from competing producers [...]." (par. 76-77)

Third,

"other rebate systems where the grant of a financial incentive is not directly linked to a condition of exclusive or quasi-exclusive supply from the undertaking in a dominant position, but where the mechanism for granting the rebate may also have a fidelity-building effect". (par. 78)

Whereas in the analysis of the third category it is necessary to consider all the circumstances, the GC says,

"the question whether an exclusivity rebate can be categorised as abusive does not depend on an analysis of the circumstances of the case aimed at establishing a potential foreclosure effect." (para. 80)

This is because

"exclusivity rebates granted by an undertaking in a dominant position are by their very nature capable of restricting competition." (para. 85)

As a consequence, if a dominant firm is using an exclusivity rebate:

(1) "the Commission must only show that a practice is capable of restricting competition" whereas "it is unnecessary to undertake an analysis of the actual effects of the rebates on competition." (para.103)

(2) "Next, given that it is not necessary to prove actual effects of the rebates, it follows necessarily from this that the Commission is also not required to prove a causal link between the practices complained of and actual effects on the market." (para.104)

(3) "Lastly, the Court would point out that, a fortiori, the Commission is not required to prove either direct damage to consumers or a causal link between such damage and the practices at issue in the contested decision." (para. 105)

Similarly, there is no need for the Commission to demonstrate the relevance of the amount of the rebates (paras. 107-109), nor the relevance of their duration (paras.110-113), nor whether only a small part of the market was concerned by the rebates at issue (paras. 114-117).

**Concluding remarks** If both *Meritor* and *Intel* share the idea that a price cost test is not necessary to establish violation of the law in the case of loyalty rebates, the European's General Court judges go much further than their US counterpart, and basically argue that economic evidence is irrelevant in evaluating loyalty rebates, because they are inherently restricting competition if used by a dominant firm.

Instead, the US judges of *Meritor* (as well as commentators who agree with their approach, see e.g. Wright, 2013) do not disregard at all economic considerations and, as described above, analyse whether there is evidence of anticompetitive conduct and effects.

Further, the US judges of *Meritor* do not seem to embrace a formalistic approach as they argue:

"Moreover, a plaintiff characterization of its claim as an exclusive dealing claim does not take the price-cost test off the table. Indeed, contracts in which discounts are linked to purchase (volume or market share) targets are frequently challenged as de facto exclusive dealing arrangements on the grounds that the discounts induce customers to deal exclusively with the firm offering the rebate. However, when price is the clearly predominant mechanism of exclusion, the price-cost test tells us that, so long as the price is above-cost, the procompetitive justifications for, and the benefits of, lowering prices far outweigh any potential anticompetitive effects." (*Meritor*, p. 32)

Finally, one point raised by Judge Greenberg, the dissenting judge, is interesting for our discussion. He argues that even in cases in which the non-price aspects of a conduct are the main drivers of the anti-competitive effect, the price-cost test may still provide useful information, and "would operate only as one element, though a significant one, of a court's and jury's inquiry under the rule of reason." (Dissenting opinion, p. 41)

### 3 Predation v. Exclusive dealing: different paradigms?

Not only lawyers and judges, but also economists have defended the approach that loyalty discounts are sufficiently similar to exclusive dealing that they should be treated like the latter, and not under a price-cost test like predatory pricing cases.

Some commentators interpret recent economic theory as suggesting that: (1) exclusive dealing and predation are of very different nature, the first belonging to the "Raising Rivals' Costs" paradigm which is very distinct from theories of predation;<sup>10,11</sup> (2) the former does not require profit sacrifice in order to exclude while the latter does; and (3) some forms of loyalty rebates, and notably market share discounts, are so close to exclusive dealing that they should be treated in the same way.<sup>12</sup>

<sup>10</sup>See e.g., Wright (2013), Steven C. Salop, 2006, "Exclusionary Conduct, Effect on Consumers, and the Flawed Profit-Sacrifice Standard", 73 *Antitrust Law Journal* 311-374, Patrick DeGraba and John Simpson, 2013. "Loyalty discounts and theories of harm in the Intel investigations", *Journal of Antitrust Enforcement*, pp.1-33.

<sup>11</sup>See for instance, Wright (2013, e.g. at pages 20 and 25) who argues that exclusive dealing and predation belong to two completely different theories of exclusion. According to Wright, exclusive dealing acts through a Raising Rivals' Costs mechanism, and the same applies to similar pricing practices: "When plaintiffs allege that loyalty discounts, market-share discounts, or partial exclusive dealing contracts violate the antitrust laws because they deprive rivals of access to a critical input, raise their costs, and ultimately harm competition, they are articulating a raising rivals' cost theory of harm rather than price predation."

<sup>12</sup>A note of warning on the similarity between exclusive contracts and market-share discounts. Although it may appear that a discount conditional on buying 100% is equivalent to an exclusive dealing clause, the two differ in an important dimension: whereas in the case of exclusive dealing a buyer commits by contract not to buy anything from rival suppliers during a certain period, in the case of the market share discount the buyer can switch at any moment to a rival, even though obviously it will have to lose the discount (and the foregone discount is the higher the more units it has bought from the supplier during the period

The remainder of this paper deals with these issues, by both reviewing existing recent theories and developing some new material (whose full formalization will be contained in the Appendix, but will be summarized in the text of the article). To anticipate our views in a nutshell, we shall show in Section 3.1 that exclusive dealing and predation, along with a number of other exclusionary practices (ranging from various forms of price discrimination to tying), often hinge on a common economic mechanism which has been identified in a number of recent economic contributions. Then, in Section 3.2 we will argue that whether or not such practices involve profit sacrifice (or below-cost pricing) is not the salient feature to distinguish among them. (We shall also recall that price below cost is not a necessary ingredient for exclusion in predation models.) However, in Section 4 we will discuss why contracts that reference rivals - i.e. contracts that condition the terms of trade on how much the buyer purchases from the rival - can be considered richer exclusionary tools as well as practices that allow to discriminate across buyers.<sup>13</sup> Finally, in Section 5 we will discuss the role of the price-cost test within this line of thoughts.

### 3.1 A common mechanism of exclusion

There exist situations in which a firm, if deprived of crucial sales, buyers, profits, becomes a poor competitor for other buyers, in other markets, in other periods. There are several sources of such a vulnerability. An obvious one is the existence of scale economies from the supply side: the firm needs to cover a fixed cost or more generally to reach a given scale in order to be successful, and access to a sufficiently large number of buyers/markets is crucial to achieve that scale. In this context, should the firm be denied access to such a critical set of buyers, then it would desist from supplying the remaining buyers or it would supply them at high costs. A similar mechanism applies if scale economies arise from the demand side and the firm needs to achieve a critical base of customers so as to generate sufficient network externalities and make the quality of its product large enough to be an effective competitor. Alternatively, there may be inter-temporal scale economies, whereby limited current production implies little accumulation of learning and causes high production costs in the future. One may also think of financial market imperfections: a firm that does not make enough profits and does not retain enough liquidity may be unable to overcome financial constraints and fails to obtain external funds to finance its investment and to continue its activity in the future.

As we argue in our forthcoming book,<sup>14</sup> a large part of the recent economic literature on exclusionary practices has shown that an incumbent firm can take advantage of this vulnerability and, by securing the critical buyers or markets, it can profitably prevent the entry of a more efficient rival, discourage its expansion beyond some market niche, or induce the rival's exit.

There are three important aspects to note. First, the literature has shown that the incumbent can make use of *several practices* that allow it to attract the critical sales (or buyers, or markets) and to exclude: exclusive dealing (as shown, for instance, by Rasmusen et al. 1991, Bernheim and Whinston 1998 and Segal and Whinston 2000,<sup>15</sup> followed by several

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established by the rebate). Therefore, other things being equal, the exclusive deals are more exclusionary than market-share discounts.

<sup>13</sup>As far as we know, this term was first used by Fiona Scott Morton, in "Contracts that Reference Rivals", Speech at Georgetown University Law Center, April 5, 2012.

<sup>14</sup>C. Fumagalli, M. Motta and C. Calcagno (forthcoming), *Monopolization. A theory of exclusionary practices*. Cambridge U.P.

<sup>15</sup>Rasmusen, E.B., J.M. Ramseyer and J.J.S. Wiley. 1991. "Naked exclusion". *American Economic Review*. 81: 1137–45. Bernheim, B.D. and M.D. Whinston. 1998. "Exclusive Dealing." *Journal of Political Economy*. 106: 64-103. Segal, I. and M.D. Whinston. 2000. "Naked exclusion: comment". *American Economic Review*. 90: 296–309.

other authors);<sup>16</sup> but also low prices to some early buyers and markets (i.e. predation, as shown by Bolton and Scharfstein 1990, Cabral and Riordan 1997 and Fumagalli and Motta 2013; the possibility to exclude by fixing low prices to early buyers arises also in Bernheim and Whinston 1998 and in Carlton and Waldman 2002),<sup>17</sup> price discrimination including various types of rebates (as shown by Karlinger and Motta 2012),<sup>18</sup> tying between a monopolised good and a complementary product for which there exists potential competition (Carlton and Waldman 2002),<sup>19</sup> refusal to supply a monopolized input to an independent downstream rival (Fumagalli and Motta, 2014).<sup>20,21</sup>

Second, there must be an *asymmetry* between the incumbent and the rival which explains why the rival is vulnerable to the loss of key buyers (markets or sales), while the incumbent is not. This asymmetry may be due to the fact that the rival is a new entrant that has not sunk the entry cost yet; it may be due to the fact that the incumbent disposes of non-contestable customers that allow it to fully exploit scale economies and network externalities; it may also be due to the fact that the incumbent is less sensitive to financial constraints than the rival because it is endowed with abundant own liquidity or because it can benefit from cash injections from the internal capital market.

Third, there is no theoretical ground from this literature to conclude that exclusive dealing and loyalty rebates do not involve *profit sacrifice*, whereas other forms of rebates and simple across-the-board pricing necessarily do. We will elaborate on this issue in the next session.

## 3.2 Exclusion and profit sacrifice

### 3.2.1 Strategic asymmetry

The possibility to use long-term exclusive contracts to exclude an efficient rival *without profit sacrifice* has been demonstrated by Rasmusen et al. (1991) and Segal and Whinston (2000). In their models there exist multiple independent buyers, and a new entrant that needs to supply a sufficiently large number of these buyers to cover the entry cost. Importantly, the incumbent (who has already sunk the entry cost) takes advantage of a strong *strategic asymmetry* relative to the new entrant: it can move first and offer long-term exclusive contracts to buyers, before the entrant materializes, takes its entry decision, and makes offers to buyers in turn. In this framework, it turns out that all the buyers may enter the exclusive dealing agreements at the equilibrium, even if they are not offered any compensation to accept exclusivity. Hence, the incumbent will extract the full monopoly profits from these buyers, when it will supply them in later periods. This outcome may arise (i) when buyers

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<sup>16</sup>See for instance the extensions to buyer-retailers as in: Fumagalli, C. and M. Motta. 2006. "Exclusive dealing and entry, when buyers compete." *American Economic Review*. 96: 785-95; Abito, J.M. and J. Wright. 2008. "Exclusive dealing with imperfect downstream competition." *International Journal of Industrial Organization*. 26: 227-246; Simpson, J. and A. L. Wickelgren. 2007. "Naked Exclusion, Efficient Breach, and Downstream Competition." *American Economic Review*. 97: 1305-20. See also the experimental paper by Spier K.E. and C.M. Landeo. 2009. *American Economic Review*, 99: 1850-1877.

<sup>17</sup>Bolton P. and D. S. Scharfstein. 1990. "A Theory of Predation Based on Agency Problems in Financial Contracting". *American Economic Review*. 80:93-106. Cabral L. and M.H. Riordan. 1997. "The Learning Curve, Predation, and Antitrust." *Journal of Industrial Economics* 45:155-69. Fumagalli C. and M. Motta (2013), A Simple Theory of Predation, *The Journal of Law and Economics*, 56, 595-631, August 2013.

<sup>18</sup>Karlinger and Motta. 2012. "Exclusionary pricing when scale matters." *The Journal of Industrial Economics*. LX(1): 75-103.

<sup>19</sup>See Carlton, D.W. and M. Waldman. 2002. "The Strategic Use of Tying to Preserve and Create Market Power in Evolving Industries." *Rand Journal of Economics*. 33: 194-220.

<sup>20</sup>Fumagalli C. and M. Motta, "Dynamic Vertical Foreclosure", *mimeo*, 2014.

<sup>21</sup>Of course, there exist other mechanisms that can rationalize profitable exclusion. For instance, there are theories of predation based on reputation (Kreps and Wilson, 1982) or signaling (Milgrom and Roberts, 1982; also, Whinston (1990) rationalises tying as a device to commit to aggressive pricing in case of entry in the tied market.

simultaneously decide on exclusivity; (ii) when buyers are approached sequentially by the incumbent.

Under *simultaneous offers*, a buyer that expects all the others to accept exclusivity is indifferent between entering or not the exclusivity agreement: it anticipates that its demand alone is insufficient to make entry profitable and that it will end up paying the monopoly price even if it rejects. All the buyers entering into exclusivity agreements (behind zero compensations) is therefore *an equilibrium*.<sup>22</sup> In this case the incumbent relies on *coordination failures* to exclude.<sup>23</sup>

Instead, when buyers are approached *sequentially*, exclusion of the rival at zero cost (i.e. achieved by offering zero compensations to buyers) is the *unique* equilibrium. To see the intuition imagine there exist two buyers, and that no one is individually sufficient to make entry profitable.<sup>24</sup> Note also that the incumbent alone can offer exclusive contracts to both buyers. The first buyer anticipates that the second buyer will accept exclusivity even if it rejects. The reason is that, if the first buyer rejects, then the incumbent is willing to offer a full compensation to the second buyer, i.e. a compensation that makes the buyer indifferent between accepting exclusivity (and paying the monopoly price) and rejecting exclusivity (and paying the post-entry competitive price). Such a compensation is larger than the monopoly profits that the incumbent extracts from the second buyer. However, the offer is profitable because once the second buyer is lured into exclusivity, then entry will not occur and the incumbent will extract the monopoly profits also from the first buyer.<sup>25</sup> By anticipating this behavior of the second buyer, the first buyer expects to pay the monopoly price irrespective of its decision on exclusivity. Then, it is willing to accept behind a negligible compensation, which induces the second buyer to do the same.<sup>26</sup>

However, it is important to note that, also in this environment in which the incumbent can exploit its first-mover advantage, there exist situations in which exclusion requires to sacrifice profits, at least on some crucial buyers. For instance, under simultaneous offers, if buyers can communicate among each other so as to avoid coordination failures, then the incumbent must fully compensate some buyers – the minimum number of buyers such that the remaining ones are insufficient to make entry profitable – to be able to exclude. This means that the incumbent is suffering losses on the subset of crucial buyers. However, the use of exclusive contracts may still allow the incumbent to exclude in a profitable way, because it extracts the monopoly profits also from the remaining buyers, who do not need to be compensated.<sup>27</sup>

Profit sacrifice also arises in a setting in which buyers are asymmetric, as we prove formally in the Appendix, Section 6.1. For instance there may exist large buyers, whose individual demand enables entry, or more generally buyers whose contribution to the entrant's success is particularly important (i.e. retailers that are crucial to legitimize the entrant vis-a-vis final consumers). One can show that it is still possible for the incumbent to exclude a more efficient rival. However, the incumbent must fully compensate the large buyer(s). To see the intuition consider again the two-buyer setting. The large buyer - anticipating

<sup>22</sup>There also exist equilibria where all buyers reject the exclusive offer (if one anticipates all others reject exclusivity, there is no reason to sign it) and entry takes place, as well as other exclusionary equilibria where buyers are offered a positive compensation.

<sup>23</sup>If all the buyers could coordinate their decisions, they would reject the exclusive offer of the incumbent and entry would take place.

<sup>24</sup>Of course, the logic can be extended to the more general case with more than two buyers.

<sup>25</sup>Of course the deal is profitable as long as twice the monopoly profits are larger than the full compensation, a condition which would be satisfied under standard demand functions. If this condition is not satisfied, exclusion does not occur at the equilibrium.

<sup>26</sup>Note that the cited exclusive dealing models rely to some extent on the assumption that exclusivity cannot be renegotiated after entry. See Fumagalli C., M. Motta and C. Calcagno (forthcoming), Chapter 3.2.5 for a discussion.

<sup>27</sup>Exclusion is profitable if the losses suffered on the subset of crucial buyers are compensated by the monopoly profits extracted from the remaining buyers.

that its individual demand triggers entry - will now reject exclusivity even when it expects the other buyer to accept, unless it is fully compensated. Therefore the incumbent does not manage to exclude at zero cost but needs to pay a full compensation to the large buyer.

### 3.2.2 No strategic asymmetry

In most real-world situations we are concerned with the possibility that a dominant firm may exclude or marginalise a rival that already exists, and that consequently can react to the offers made by the incumbent, unlike the models described above where only the incumbent can sign exclusive deals with the buyers.

One may believe that removing the first-mover advantage hypothesis and allowing a more efficient rival to compete for buyers makes inefficient exclusion impossible:<sup>28</sup> whatever the offer the incumbent makes to buyers - one may believe - the more efficient rival can always make a more favourable counteroffer and avoid exclusion. In fact, this intuition is not necessarily correct. In what follows we summarise the formal analysis that we develop in the Appendix, section 6.2.1.

Suppose that the incumbent and an entrant compete for the exclusivity of two buyers that are approached *sequentially*.<sup>29</sup> Buyers can accept either exclusive offer, or reject both. The reason why exclusion of the more efficient rival may take place stems from the interaction between an incumbency advantage – e.g. the fact that the incumbent has already sunk the entry cost when offers to the first buyer are made while the entrant has not – and important scale economies, which manifest themselves in the fact that the entrant can operate profitably only if it manages to supply both buyers.

This cost structure implies that if the incumbent manages to sign up the first buyer, then the rival will not enter, as the second buyer alone is insufficient to make entry profitable. Hence, the incumbent will also supply the second buyer, and will extract monopoly profits from it. If instead it is the rival that signs up the first buyer, then the incumbent will compete for the following one (recall that the incumbent has already sunk its costs), thereby limiting the rents that the entrant can extract from the second buyer.

Hence, when the incumbent and the rival compete for the first buyer - anticipating that who secures the first buyer into exclusivity will also supply the second - there will be two effects at play. On the one hand, the fact that the rival is more efficient than the incumbent in supplying the two buyers allows it to make more aggressive bids for the first buyer; on the other hand, the perspective of higher rent extraction from the second buyer makes the incumbent more aggressive. It is possible to show that if the (overall) efficiency advantage of the entrant is not strong enough, then it is the incumbent that will make the winning bid for the first buyer. Therefore, the incumbent manages to secure exclusivity with the first buyer and the more efficient rival is excluded from the market, which decreases total

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<sup>28</sup>Two comments are at issue here. First, it is generally assumed that the entrant is more efficient than the incumbent to make the analysis relevant: if the entrant was less efficient, then its exclusion would not necessarily be welfare-detrimental. Second, the entrant is more efficient if it served the same number of buyers as the incumbent.

<sup>29</sup>Of course the same results generalize to the more general case with  $N$  buyers.

welfare.<sup>30,31</sup>

There are five features concerning this result that need to be highlighted.

**Profit sacrifice is needed when competing for exclusivity.** First, it is important to note for our discussion that, when exclusion takes place in this framework without first-mover advantage, the incumbent *does have to make a profit sacrifice*. Indeed, we show in the Appendix, section 6.2.1, that the compensation which is offered to the first buyer is such that the incumbent makes a loss on it (obviously, this will be more than compensated by the monopoly profit earned on the second buyer.)

**Simple linear pricing also achieves exclusion.** Second, in this same framework in which buyers (markets) appear in sequence and the rival has not incurred the entry cost yet when competition for the first buyer starts, exclusion of the more efficient rival may arise even if firms do not offer exclusive contracts, but compete in simple linear prices. Indeed, it is possible to show that predation arises at the equilibrium, if the efficiency gap between the incumbent and the rival is not too large. Then, the incumbent sets below-cost prices to the early buyers that the rival is unable to match, and it will recover profits on the later buyers.<sup>32</sup>

**Market-share discounts.** Third, within the same sort of model and timing, market-share discounts can also be showed to exclude more efficient entrants, with the additional insight that they can facilitate exclusion by allowing the incumbent to target the contestable part of the buyer's demand, as we show formally in the Appendix, Section 6.2.2. Also in this case the rival has not achieved efficient scale yet when competition for the early buyers take place. However, part of the demand of each buyer is non-contestable by the rival, perhaps because of strong preferences or brand loyalty by some final consumers for the incumbent's product. Apart from this, the mechanism is the same as before: supplying the contestable demand of the later buyers is not enough for the competitor to achieve efficient scale, it also needs to supply the contestable demand of the early buyers. This feature, together with the incumbency advantage, limits the rents that the more efficient rival manages to extract from later buyers as compared to the incumbent. In turn, this puts the incumbent in the position of offering a very large discount to the early buyers – *conditional on their purchases exceeding a properly defined threshold* – a discount that the rival may be unable to match. Hence, inefficient exclusion arises at the equilibrium if the incumbent's efficiency disadvantage is not too large. What is important for our discussion is that the discount offered to the early buyers entails that the contestable units are effectively sold below costs. However, on the

<sup>30</sup>This result was first obtained by Bernheim and Whinston (1998) in a context where the set of contracts that the sellers can offer is quite general. Indeed, each seller can simultaneously offer contracts which (a) are contingent on whether trade will occur in exclusivity or not and (b) which include a commitment on the transaction price. However, the underlying mechanism is the one described above: exclusivity with the incumbent may arise because, by excluding the entrant and thus softening second-period competition, it allows the incumbent to extract larger rents from the second buyer, i.e. from an agent not involved in the initial negotiation. In other words, exclusivity with the incumbent maximises the joint payoff of the agents contracting in the first period - i.e. the incumbent, the entrant and the first buyer - and then allows the incumbent to make an offer to the first buyer that the entrant cannot outbid. Further, exclusion is inefficient because such agents do not take into account the detrimental effect of their choice on the payoff of the second buyer, i.e. they do not internalise the negative externality exerted on the agent not involved in the first-period negotiation. Hence, their most preferred outcome ends up being socially inefficient.

<sup>31</sup>See also Spector D. 2011 "Exclusive contracts and demand foreclosure". *RAND Journal of Economics*. 42(4): 619-638. The paper shows in a general framework that inefficient exclusion of a competitor facing increasing returns to scale is still possible when the incumbent's first mover advantage is removed and the competitor can make counteroffers, even though it is less likely as compared to the the first-mover advantage setting.

<sup>32</sup>See Fumagalli and Motta (2013).

non-contestable units the price charged to the early buyers may be sufficiently high that there is an overall positive profit out of these buyers. In terms of policy, this result warns us again on how to properly conduct the price-cost test: it is not on all the units sold to a buyer that the price-cost test should be made, but rather on the contestable units, as implied by the as-efficient competitor test that is suggested by the Article 102 Guidance Paper of the European Commission.

**Entry deterrence vs. barriers to expansion.** Fourth, the mechanism described above can be generalised, and the incumbent may manage to marginalize a rival that is already in the market rather than deterring an entrant, and may do so in a wide set of situations that go beyond the case in which the rival has not sunk the entry cost when competition for the early buyer(s) takes place. Indeed, the same logic applies to all the cases in which the incumbent and the rival compete for *new* buyers, and due to scale economies and the incumbent's larger base of old customers (but the same would be in case of learning effects, networks externalities, etc. as mentioned at the beginning of Section 3.1) the smaller rival is poorly competitive on a subset of the new buyers, even if it is more efficient than the incumbent on all of them.<sup>33</sup> Again, exclusion may take place, with the rival being relegated to a niche role.

**Simultaneous purchases and buyer miscoordination.** Finally, we have referred in this Section to a framework in which the incumbent does not benefit from a first-mover advantage and in which exclusion requires it to suffer losses on the early buyers. However, lack of first-mover advantage does not necessarily imply that exclusion involves profit sacrifice. Indeed, if the incumbent and the rival make offers to *all* the buyers who decide *simultaneously*, then the scope for *buyers' coordination failures* arises. By relying on miscoordination the incumbent may exclude the more efficient rival *without profit sacrifice*, and can do so by making use of either exclusive contracts,<sup>34</sup> or simple across-the-board pricing schemes (see Fumagalli and Motta, 2008,<sup>35</sup> or Karlinger and Motta, 2012). For instance, if the incumbent offers to supply all the buyers at the monopoly price, an equilibrium exists in which all of them accept this offer even if the rival proposes a lower price. The intuition for this result is that a buyer that expects all the others to accept the incumbent's offer has no incentive to address the rival. If its individual demand is insufficient to make the rival's activity viable, then the deviant buyer would have to purchase anyway from the incumbent at the monopoly price. Again, this result hinges upon the existence of (i) scale economies; (ii) an asymmetry between the incumbent and the rival: the latter is a potential entrant that has not paid the entry cost yet when offers to the buyers are made; alternatively it is an existing rival that cannot rely on enough captive buyers to achieve efficient scale, or that has not accumulated enough learning in the past, or a large enough customer base; (iii) demand is split across several buyers.

### 3.2.3 Summary

In this section we have referred to the existing literature on exclusionary practices as well as developed some new results, to argue that there is no theoretical foundation for maintaining that profit sacrifice is *the* feature that distinguishes predatory pricing (defined as across the board price cuts) from exclusive dealing or loyalty discounts. Indeed, we have seen that

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<sup>33</sup>See Fumagalli and Motta (2013), for a model in which predatory prices may exclude an existing rival.

<sup>34</sup>We have seen that in the model of Segal of Whinston (2000) miscoordination creates the scope for exclusion in a context with a first-mover advantage but the same logic applies when the incumbent and the rival compete by offering long-term exclusive contracts.

<sup>35</sup>Fumagalli C. and M. Motta. 2008. "Buyers' Miscoordination, Entry and Downstream Competition." *Economic Journal*. 118: 1196-1222.

there may be the same common mechanism of anticompetitive exclusion behind all these practices. Further, we have showed that exclusive dealing (and loyalty discounts) do require profit sacrifice to achieve exclusion in very similar circumstances as predation.

## 4 Practices that raise more severe anti-competitive concerns

Whereas the economic literature does not suggest that exclusive dealing and loyalty discounts allow an incumbent firm to exclude without profit sacrifice whereas simple pricing schemes do not, it *does* suggest that there might be a difference across these practices in terms of exclusionary concern.

**Long-term exclusive contracts.** First, as already discussed in Section 3.2.1, *long-term* exclusivity agreements may facilitate an incumbent that moves first in excluding a more efficient rival. Of course, a simple pricing scheme that does not involve a long-term commitment would not allow the incumbent to take advantage of the possibility to make an offer ahead of the rival.

Interestingly, in a context in which long-term agreements with the incumbent are already in place, the fact that *expiry dates are staggered* may facilitate the exclusion of a more efficient rival, even if the rival makes offers when contracts are renewed. This argument has been recently formalized in Cabral (2014): under per-period scale economies, the rival is less efficient than the incumbent in supplying the free buyers (whose contract is renewed) in any given period. The reason is that the incumbent can exploit the sales to the buyers whose contract has not expired yet to achieve efficient scale in that period, while the rival cannot. The advantage provided by the interaction between scale economies and staggered contracts may be strong enough to dominate the rival's efficiency advantage and allow the incumbent to always win competition for the contracts to be renewed.<sup>36</sup>

**Contracts that reference rivals.** Second, the literature suggests that, even if one abstracts from the long-term dimension and considers short-term competition between the incumbent and the rival, *contracts that reference rivals* - i.e. contracts that condition the terms of trade on how much the buyer purchases from the rival - may raise more severe anti-competitive concerns.

Bernheim and Whinston (1998) is the first paper to deliver this insight. In the context in which the incumbent and the rival compete for buyers that appear in sequence (see Section 3.2.2), they show the possibility to offer the first buyer a contract with an explicit exclusivity requirement may increase the scope for exclusion. The intuition is that an explicit exclusivity clause allows the incumbent to secure the first buyer while introducing fewer distortions on the sales made to it as compared to the case of no exclusivity requirement. To see this point, imagine that the incumbent and the rival offer two-part tariffs to the buyers.<sup>37</sup> As we already discussed, the interaction between the incumbency advantage and the existence of scale economies may limit the rents that the rival is able to extract from the second buyer, and may put the incumbent in the position to make a more aggressive bid for the first buyer, despite its efficiency disadvantage over total sales. In this context with two-part tariffs, the winning bid of the incumbent would entail a linear component at marginal cost, and a negative fixed fee, i.e. a compensation for the buyer if it addresses the incumbent. However,

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<sup>36</sup>Cabral L. 2014. "Staggered Contracts, Market Power, and Welfare". CEPR Discussion Paper No. DP10095. Available at SSRN: <http://ssrn.com/abstract=2501568>.

<sup>37</sup>Two-part tariffs are simple scheme in which the total price paid by a buyer is composed of a fixed and a variable component.

following this offer, the buyer would have an incentive to cash-in the compensation and then buy from the rival. The incumbent can discourage such an opportunistic behavior of the buyer by imposing an explicit exclusivity requirement. Absent exclusivity, the incumbent might resort to below-cost linear pricing, which introduces an allocative inefficiency in the sales to the first buyer and may limit the scope for profitable exclusion as compared to exclusivity contracts. We provide a formal proof of this argument in the Appendix, section 6.2.3.

Note that what is crucial for the incumbent is to limit the buyer's purchases from the rival. Under certainty on the buyer's demand, this same outcome may be achieved by making the payment of the compensation conditional on the buyer purchasing most of its requirements from the incumbent, or on the buyer's purchases exceeding a properly defined quantity threshold. However, if demand is subject to positive shocks, market-share discounts and quantity discounts may be less effective than exclusivity requirements. Similarly, if the suppliers' products are differentiated and buyers love variety, a quantity discount may not be enough to limit buyer's sales from the rival because the buyer, stimulated by the low discounted price, would buy a lot from the incumbent, and then would buy enough additional units from the rival.

More recently, other papers lead to the same conclusion that contracts that reference rivals are more likely to be anti-competitive, even though they refer to a completely different framework that does not rely on scale economies. For instance, Calzolari and Denicoló (2014) consider a setting in which a dominant firm competes with a smaller rival. There are two crucial ingredients: (i) the dominant firm enjoys a competitive advantage vis-a-vis the rival: it is more efficient or it offers a higher quality product (this is the reason why it is dominant); (ii) buyers' willingness to pay for the products is private information. In this context, exclusive contracts (or more generally contracts that reference rivals) act as a more powerful screening device – meaning that they allow the incumbent to leave fewer information rents to the buyers – and for this reason are more profitable than contracts that do not reference rivals. The intuition is that the incumbent has to introduce the usual distortions on low types (low demand buyers) so as to limit the information rents left to high types (high demand buyers). Without exclusivity the incumbent introduces downward distortions on the sales it makes to low types, thereby sacrificing own profits; instead, with exclusivity it introduces distortions on the amount buyers purchase from the rival, which is more profitable. However, precisely because introducing distortions is more profitable, more distortions are created under contracts that reference rivals, and such contracts turn out to be welfare detrimental.<sup>38</sup>

Choné and Linnemer (2014), instead, consider a setting in which the incumbent and a buyer negotiate at a time in which the characteristics of the rival, for instance its marginal cost or the quality of its product, are not yet known. We know from Aghion and Bolton (1990) that, in this context, the incumbent and the buyer may use an exclusive contract including penalties for breach as an instrument to extract rents from the more efficient rival. The intuition is that the penalty forces the rival to offer a very low price to the buyer, so as to induce breach of exclusivity, and acts as a rent-shifting mechanism (the penalties are cashed in by the incumbent). However, since the penalty is established when the rival's characteristics are uncertain, it may turn out to be too high ex-post, and hence cause inefficient exclusion. Choné and Linnemer (2014) extend the analysis to the case in which the incumbent and the buyer agree on non-linear pricing schemes and sell differentiated products. Rebate schemes play a role similar to the penalty for breach, placing competitive pressure on the rival and inducing the latter to offer a low price. The new insight of the paper is that rebate schemes may also create the scope for opportunistic behavior of the

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<sup>38</sup>Calzolari G. and V. Denicoló. 2014. "Exclusive contracts and market dominance", mimeo, Universit a di Bologna.

buyer, who ex-post has an incentive to purchase inefficiently many units from the incumbent to pocket the rebate. The paper compares rebate schemes that reference the rival and rebate schemes that do not: the former allow the incumbent to eliminate buyer opportunism, but the rival's supply is distorted more downwards as compared to non-conditional rebates. This explains why conditional rebates may turn out to be more detrimental for welfare than non-conditional rebates.<sup>39</sup>

**Contracts that target specific buyers.** Third, the literature also suggests that the ability to target specific buyers is another important feature that makes the anti-competitive effect more likely. In a setting with a first-mover advantage (only the incumbent can offer exclusive contracts), Segal and Whinston (2000) show that the possibility to discriminate contractual conditions across buyers allows the incumbent to implement a divide-and-conquer offer, i.e. to fully compensate the crucial buyers (thereby suffering losses on them) while extracting the monopoly profits on the others. If the divide-and-conquer strategy is profitable, any possible entry equilibrium is broken. Then, the equilibria in which the more efficient rival is deterred from entering the market are the unique ones to exist. Instead, when contract offers need to be homogeneous, entry equilibria (i.e. equilibria in which the buyers do not agree on exclusivity and the entrant enters the market) always exist, together with exclusionary equilibria where buyers suffer from coordination failures.

In a similar vein, Innes and Sexton (1993) show that an incumbent firm can implement divide-and-conquer price discrimination: some customers are offered high prices, while others receive lower prices.<sup>40,41</sup> In their setting buyers can organize themselves and enter the market as producer of the good, but this entails fixed set-up costs. Critical buyers – i.e. the subset of buyers such that the remaining ones do not find it profitable to enter upstream production – are the ones offered rebated prices, which are prices sufficiently low to make them prefer the incumbent's offer to self-supply.

Divide-and-conquer offers also play a role when the incumbent and the rival make simultaneous offers to all the buyers. Karlinger and Motta (2012) show that in an industry characterised by network effects price discrimination reduces the set of achievable (socially efficient) entry equilibria. In their setting the incumbency advantage is due to the fact that the incumbent can rely on established customers and has already achieved the critical size when competition starts, while the entrant has not.<sup>42</sup> This asymmetry allows the incumbent to break some potential entry equilibria by making an aggressive below-cost price offer to the subset of crucial buyers (the ones without which the rival is unable to achieve efficient scale) while recouping on the others. The rival has to set a price which is low enough on all the buyers to block the divide-and-conquer strategy of the incumbent, and such prices are profitable only if the efficiency gap with the incumbent is large enough. Otherwise, entry equilibria do not exist. Karlinger and Motta (2012) also shows that the incumbent can use different form of price discrimination, from explicit discrimination (i.e. individualised price offers) to implicit discrimination (for instance standardised quantity discounts) or even random coupons. They show that the finer the discriminatory pricing policy the more effective the aggressive price offers, and hence the stronger the exclusionary effect.<sup>43</sup>

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<sup>39</sup>Choné P. and L. Linnemer. 2014. "Nonlinear pricing and exclusion: I. Buyer opportunism". *Rand Journal of Economics*, forthcoming.

<sup>40</sup>Innes, R. and R.J. Sexton. 1993. "Customer coalitions, monopoly price discrimination and generic entry deterrence." *European Economic Review*. 37: 1569-97.

<sup>41</sup>Innes and Sexton (1993) was probably the first paper to illustrate a divide-and-conquer strategy whereby a certain number of agents are offered good terms of purchase, thereby reducing the scale available for the rival and exerting a negative externality on the remaining agents.

<sup>42</sup>Their result extends to the case of supply side scale economies, in which the rival has not paid the entry cost yet when offers to buyers are made. For a formal analysis, see chapter 2.4.2 of C. Fumagalli, M. Motta and C. Calcagno (forthcoming), *Monopolization. A theory of exclusionary practices*. Cambridge U.P.

<sup>43</sup>Chapsal (2013) shows that the same exclusionary mechanism based on scale economies also applies to

**Conclusions** In this section we have showed that contracts that are of long duration, reference rivals or discriminate across buyers have a stronger exclusionary potential. Simple spot prices and linear prices that apply to all customers include no such features, whereas exclusive contracts and loyalty rebates typically contain them. In this sense, the latter may possibly have a stronger exclusionary potential than the former, and may warrant a stricter attention from competition authorities. In the next session we discuss the implications that can be drawn from such conclusions for the use of the price-cost test.

## 5 Policy implications

The economic literature reviewed in Section 3 does not support the view that the price-cost test represents *the* test of whether a given practice is used by a dominant firm with an exclusionary purpose.

Even the theories that rationalise predatory pricing do not always establish a link between below-cost pricing and ability to exclude. It is true that in the environment with sequential buyers and scale economies discussed in Section 3.2.2, below-cost pricing on the early buyers is necessary for the incumbent to exclude the more efficient rival. However, in other theories of predation, below-cost pricing is not a necessity. For instance, the deep-pocket theory of predation predicts that the incumbent competes aggressively in early periods so as to limit the prey's retained earnings and, consequently, the prey's ability to obtain external funds in later periods. However, the fact that competition is more aggressive as compared to a benchmark in which the incumbent does not want to exclude does not imply that the incumbent is suffering losses in such early periods. Similarly, in reputation and in signalling theories of predation, the predator sets a lower price than in the counterfactual scenario in which it does not want to exclude its rival, but this does not necessarily imply charging below-cost pricing.

All this does not mean that a price-cost test is useless. Even though the theory tells us that below-cost pricing is not necessary for exclusion, when firms use across-the-board price cuts to steal business to each other, the risk of chilling legitimate competition is so high that applying the price-cost test as a *safe harbor* is commonly considered a reasonable criterion. Further, we know that predation implies profit sacrifice in the sense that the predator makes lower profits than a counterfactual. Since counterfactual profits are difficult to measure, then below-cost pricing can be considered a proxy for profit sacrifice (although this increases type II errors).

At the opposite extreme, given the anti-competitive potential they imply, it might be reasonable not to offer a price-above-cost safe harbour to practices such as exclusive dealing. Nevertheless, a finding that prices are above costs would still be informative. When the incumbent's prices are above its (appropriate measure of) costs, an as-efficient rival has the scope to make an offer which is more appealing to buyers than the dominant firm's without incurring losses, which forces us to understand why this is not enough for the rival to be successful.

Economic theory identifies situations where a rival is excluded or marginalised even if the incumbent does not incur losses on any buyers, but whether the facts of the case match the crucial ingredients of the theory must be checked. Is there the scope for coordination failures? Could the incumbent take advantage of a strong strategic asymmetry? Is private information on the buyers' valuations pronounced? Can the incumbent rely on a non-contestable part of demand? Can it threaten the buyers not to supply the non-contestable

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retroactive discounts (also called 'back-to-dollar-one' discounts), which allow the incumbent to discriminate between recurrent buyers and occasional buyers. In his model, the incumbent charges a repeat buyer a very high price on the first units he buys (before entry may take place) and a price below marginal cost on the later units (when the entrant can compete), thereby leading to possible exclusion of the entrant.

demand if exclusivity is not met? Is the threat credible?

We would find it difficult to find an infringement of antitrust law without a thorough analysis of the market and a careful understanding of why an as -efficient firm is not able to compete even if the incumbent does not make losses on any subset of buyers. (Recall that the price-cost test should be applied not on average, but at the level of single buyers, or subset of units of the same buyer: the divide-and-conquer strategy entails that the incumbent might suffer losses on some crucial buyers while recouping on the others.)

Similarly, we believe that any evidence of below-cost pricing should be complemented by a careful analysis of the case, which includes understanding of the theory of harm, and in particular whether there is a coherent strategy of exclusion, and what is the mechanism for the likely recoupment of any losses.<sup>44</sup>

Between the two extremes of across-the-board predation and exclusive dealing, there exist not only loyalty rebates but also a number of other forms of price discrimination, such as discounts awarded for buying a certain number of units over a given period, which under some circumstances may have very similar features as loyalty rebates.<sup>45</sup>

In all these cases, there is ambiguity as to the role that the price-cost test should play. On the one hand, such pricing schemes are widespread and the risk of chilling healthy rivalry may be as high as in the case of simple across-the-board pricing. On the other hand, since they involve some degree of price discrimination, and they more or less explicitly reference rivals,<sup>46</sup> such practices may allow the incumbent to achieve more severe exclusionary effects.

We see no obvious place where to draw the line between practices for which above-cost pricing should be a safe harbor and those for which it should not. We argued above that the exclusionary potential of loyalty rebates may call for a stricter treatment by antitrust agencies. This may justify denying an above-cost pricing safe harbour for loyalty rebates (and to some extent to similar practices such as discounts contingent on purchasing a certain quantity over a certain period), but admittedly such a conclusion is far from automatic.

However, irrespective of the role that one wants to give to the price-cost test, we want to stress again the importance of articulating a theory of harm, i.e. a coherent story that rationalises the exclusionary objective served by the practice, and to check whether the facts of the case match the theory.

In particular, if one wants to check whether the mechanism discussed in this paper is the one rationalising exclusion, then a number of issues need to be addressed. First of all, one should try to understand whether behind the practice at hand there may be objective justifications or efficiency rationales. For instance, a seller may want to have a certain number of guaranteed sales in exchange for offering financial assistance, training or other help to a buyer (to avoid that a rival may benefit from the investment in the buyer).

Next, one should look at what is the proportion of the market involved by the practices/clauses at issue (little scope for exclusion if the buyers at issue represent only a small part of the market), and their duration (note, though, that in case of investments, a sufficiently long period may be justified by the necessity of recouping the cost of the investment).

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<sup>44</sup>Under US law, proving likely recoupment is necessary for a finding of predation. Under EU law, it is not: the first leg of an abuse of dominance case is the finding of dominance, which itself should be indicative of the ability to recoup after exit of the prey. Still, we submit that an understanding of how and why the dominant firm expects to recoup any loss it may have incurred during the predatory episode is a useful cross-check of the theory of harm.

<sup>45</sup>Suppose for instance that a buyer's demand is certain and equals 100 units in a given period; there is no difference between a loyalty discount which awards  $x\%$  reduction in exchange of purchasing at least, say, 80% of orders and a quantity discount which awards the same  $x\%$  reduction in exchange of buying at least 80 units in the period. Note that the fact that demand is certain and that suppliers' products are not differentiated are crucial factors for the equivalence between loyalty discounts and quantity discounts. As already discussed at page 15, if these conditions are relaxed, then quantity discounts represent a less effective tool than loyalty discounts to limit the buyer's purchases from the rival.

<sup>46</sup>To continue the example above, a requirement to buy at least 80%, or at least 80 units, from the incumbent, is equivalent to a requirement of buying less than 20%, or less than 20 units, from the rival.

Further, the theories of exclusion described above call for (among others): the identification of important asymmetries between the dominant firm and its rival; an analysis of the fragmentation of the demand side of the market, and in particular of whether lack of access to some crucial buyers may impair the rival's ability to compete and why; an understanding of whether scale economies (on the demand or the supply side) are prevalent; and of the degree of discrimination of contractual conditions (individualised pricing schemes are more exclusionary than standardised ones).

Finally, one should analyse the likely effects of the practices at hand on the rival(s) and on consumers.

It seems to us that this way of approaching an exclusive dealing or a loyalty rebate case is not very distinct from the type of analysis carried out by the US courts in such cases as *Meritor* or *Eisai*: in a rule of reason approach, US judges are routinely asking this type of questions. Unfortunately, though, this is not what EU courts would do if the views expressed by the judges in *Intel* prevailed: for a finding of infringement, it would be sufficient to show that a dominant firm has used a loyalty rebate, even if this involved few and small customers accounting for an overall very small market share, and if the practice at hand had no effects whatsoever on rivals and consumers. However important and interesting, a discussion of the role of price-cost tests becomes very marginal in a context where there is little or no consideration for an analysis of the market, of the practice, and of its effects.

## 6 Appendix

### 6.1 Exclusive dealing under a first-mover advantage: the case of asymmetric buyers

Let us consider the following model. In the first stage, the incumbent (denoted as firm  $I$ ) offers the small buyer  $B_S$  a compensation  $x_s$  in order for it to accept an exclusive contract. The first buyer decides. Then the incumbent approaches the large buyer  $B_L$  and offers a compensation  $x_L$ . The second buyer decides. In the second stage the potential entrant, denoted as firm  $E$  - after having observed the buyers' decision on exclusivity - decides on entry (and sinks the entry cost  $F$  if it enters). In the last stage, active firms choose prices and sell (the same homogeneous good). We assume Bertrand competition post-entry.

The entrant exhibits a lower marginal cost than the incumbent:  $0 = c_E < c_I$  with  $c_I < 1/2$ . Demand of the large buyer is given by  $D_L(p) = \frac{5}{4}D(p)$  while demand of the small buyer is given by  $D_S(p) = \frac{3}{4}D(p)$ , with  $D(p) = 1 - p$ . Total demand is  $2D(p)$ . Finally, the entry cost is large enough to make entry unprofitable if sponsored by the small buyer alone, but it is small enough to make entry profitable if sponsored by the large buyer:

$$\frac{3}{4}c_I D(c_I) < F < \frac{5}{4}c_I D(c_I) \quad (1)$$

We prove the following:

**Proposition 1** *The unique equilibrium is such that the new entrant is excluded from the market but the incumbent fully compensates the second large buyer, i.e. it pays a compensation  $x_L = \frac{15(1-c_I)^2}{32}$ .*

**Proof.** Let us solve the game backward. The large buyer anticipates that its demand alone is sufficient to make entry profitable. Hence, if it rejects exclusivity, it will pay the competitive price  $c_I$  irrespective of the decision that the small buyer took before it. In order to accept exclusivity, the second buyer requires to be fully compensated, i.e. to receive at least the amount  $x_L^* = \frac{15(1-c_I)^2}{32}$  that compensates it for the loss suffered by paying the monopoly

price instead of the competitive price. Note that the full compensation is larger than the monopoly profits that the incumbent extracts from the large buyer and that amounts to  $\pi_L^m = \frac{5(1-c_I)^2}{16}$ . Hence the incumbent is suffering losses on the large buyer. Nonetheless the incumbent finds it profitable to offer such a compensation to the second buyer because by securing the second buyer into exclusivity entry will not occur and the incumbent will extract the monopoly profits also from the small buyer:  $\pi_S^m + \pi_L^m = \frac{(1-c_I)^2}{2} > x_L^*$ . As a consequence, the first small buyer anticipates that it will pay the monopoly price irrespective of its decision on exclusivity. Indeed, even if it rejects, then the incumbent will induce the second buyer to accept by fully compensating it, and entry will not occur. At the equilibrium exclusion takes place with the incumbent offering a zero compensation to the first small buyer and fully compensating the large buyer.<sup>47,48</sup> ■

It is important to make two remarks. First, notice the difference with respect to the case in which no buyer's demand is large enough to attract entry, as analysed by Segal and Whinston (2000) and discussed in Section 3.2.1, page 10. Also in that case the first buyer anticipates that, if it rejects exclusivity, then the incumbent will find it profitable to fully compensate the second buyer and lure it to exclusivity. Then, the first buyer is indifferent between rejecting exclusivity and accepting behind a zero compensation. At the equilibrium the first buyer accepts exclusivity behind a zero (or a negligible) compensation, but differently from the large buyer case, this induces also the second buyer to accept behind a zero compensation. In that case the incumbent excludes at zero cost, whereas in the large buyer case the incumbent has to fully compensate the second large buyer.

Second, the above analysis assumes a specific level of asymmetry between the two buyers. By generalising the analysis one can show that if the degree of asymmetry exceeds a given threshold, then the monopoly profits extracted from the small buyer become insufficient to cover the losses suffered on the large buyer. In that case, exclusion would not arise at the equilibrium.

## 6.2 No first-mover advantage

### 6.2.1 Competing for exclusivity\*

We analyse a game where the incumbent and the entrant compete for exclusivity. We assume that: demand for the homogeneous good is given by  $D(p) = 1 - p$ ; the incumbent and the entrant have marginal costs characterised by  $c_E = 0 < c_I < 1/2$ ; if it enters the entrant has to pay a fixed cost  $F$  with  $c_I(1 - c_I) < F < 2c_I(1 - c_I)$ ; there are two identical buyers  $B_1$  and  $B_2$ .

The game is as follows. In the first stage, the incumbent and the entrant simultaneously offer  $B_1$  an exclusive contract including a compensation  $x_I^1$  and  $x_E^1$ .  $B_1$  can either accept one of the exclusive dealing offers or reject both of them. In the second stage, firm  $E$  decides whether it wants to enter and if so it sinks its entry cost  $F$ . In the third stage, the two suppliers again compete in exclusivity for  $B_2$ , who can either accept one of the two, or reject both. Finally, active firms set (linear) prices to buyers, consistently with the contracts have been signed; for instance, a buyer who has signed exclusivity with firm  $i$  can buy only from that firm.

We prove the following:

**Proposition 2** *There exist a threshold level of the incumbent's marginal cost,  $\tilde{c}_I \equiv 1 - \sqrt{15}/5$ , and a threshold level of the entry cost,  $\tilde{F}(c_I) \equiv \frac{18c_I - 13c_I^2 - 2}{8}$ , such that:*

*(i) If either  $c_I \leq \tilde{c}_I$  or  $c_I > \tilde{c}_I$  and  $F \geq \tilde{F}(c_I)$ , then the first buyer accepts the exclusivity*

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<sup>47</sup>In terms of payoffs, the equilibria in which the first buyer accepts under a zero compensation and the one in which it rejects are equivalent.

<sup>48</sup>Whether the large buyer is approached first or second is irrelevant for the result.

*offer of the incumbent and the entrant does not enter the market. Both buyers pay the incumbent's monopoly price.*

(ii) *If  $c_I > \tilde{c}_I$  and  $F \leq \tilde{F}(c_I)$ , then the first buyer accepts the exclusivity offer of the entrant. The entrant enters the market. The first buyer pays the entrant's monopoly price, while the second buyer pays the competitive price  $c_I$ .*

**Proof.** We solve the model by backward induction. At the last stage, a buyer  $i$  who has accepted the exclusive dealing offer (henceforth, ED) of firm  $I$  pays  $p_I^m = (1 + c_I)/2$  and obtains surplus  $(1 - c_I)^2/8 + x_I^i$ . Firm  $I$  has profits  $(1 - c_I)^2/4 - x_I^i$ . A buyer  $i$  who has accepted ED of firm  $E$  (and firm  $E$  has entered the market) pays  $p_E^m = 1/2$  and obtains surplus  $1/8 + x_E^i$ . Firm  $E$  makes profits  $1/4 - x_E^i$ . If a buyer has rejected both ED and firm  $E$  did not enter the market, then at the last stage the buyer will pay  $p_I = (1 + c_I)/2$  and obtain surplus  $(1 - c_I)^2/8$ . Firm  $I$  obtains profits  $(1 - c_I)^2/4$  from this buyer. Finally, if a buyer has rejected both offers and the entrant has entered, then price competition results in the buyer buying from the entrant at price  $c_I$  and obtaining surplus  $(1 - c_I)^2/2$ . The entrant makes profits  $c_I(1 - c_I)$  on this buyer.

Let us now move to stage 3. We have two cases to consider. (i) If firm  $E$  has entered, then whatever the outcome of the negotiations with  $B_1$ , the second buyer rejects any ED offer at the equilibrium. This is because, like in the Chicago School setting, no firm is able to make a high enough offer to compensate  $B_2$  of the lost surplus in case of acceptance. By signing with  $I$ ,  $B_2$  would lose  $(1 - c_I)^2/2 - (1 - c_I)^2/8 = 3(1 - c_I)^2/8$ , which is larger than the maximum amount that the incumbent is willing to offer, namely  $(1 - c_I)^2/4$ . By signing with  $E$ ,  $B_2$  would lose  $(1 - c_I)^2/2 - 1/8$ , while  $E$  would be willing to offer at most  $1/4 - c_I(1 - c_I)$ . It is easy to check that the latter is lower than the former under our assumption that  $c_I < 1/2$ . (ii) If firm  $E$  has not entered, then  $B_2$  will have to pay monopoly price to  $I$  whatever she does. By indifference, she is willing to accept ED even at zero compensation.

At the entry stage, there are three possible cases. (i) If  $B_1$  did not sign any ED, then firm  $E$  anticipates that upon entering it will serve both buyers at the duopoly prices, thereby making  $2c_I(1 - c_I) - F > 0$ : it enters. (ii) If  $B_1$  signed with  $I$ , the entrant will not enter since it anticipates that it would make  $c_I(1 - c_I) < F$ . (iii) If  $B_1$  had accepted  $E$ 's offer, then the entrant enters as it anticipates that the continuation profits  $1/4 + c_I(1 - c_I) - F$  are positive. (Note that the entrant has already paid the compensation  $x_E^1$  to the first buyer, hence the amount of the compensation does not affect the entry decision.)

Let us now turn to the first stage. If  $B_1$  accepts ED from  $I$ , firm  $E$  will not enter.  $B_1$  will pay  $p_I^m$  and its expected surplus will be  $(1 - c_I)^2/8 + x_I^1$ . If it accepts ED from  $E$ , then entry will occur.  $B_1$  will pay the entrant's monopoly price and its surplus will be  $1/8 + x_E^1$ . By rejecting both ED offers,  $B_1$  will pay the competitive price  $c_I$  and will have a surplus  $(1 - c_I)^2/2$ . Therefore,  $B_1$  will prefer the incumbent's ED over the entrant's ED if (and only if)  $x_I^1 \geq x_E^1 + 1/8 - (1 - c_I)^2/8$ . Note that a compensation slightly higher than that of the entrant's is not enough for the incumbent to induce  $B_1$  to prefer its own exclusivity offer over the rival's. The incumbent must also compensate the buyer for the loss it suffers paying its monopoly price rather than the entrant's lower monopoly price. Further,  $B_1$  will prefer the incumbent's ED over rejection of both offers if (and only if)  $x_I^1 \geq (1 - c_I)^2/2 - (1 - c_I)^2/8 = 3(1 - c_I)^2/8 \equiv x_{I,\min}^1$ . Finally,  $B_1$  will prefer the entrant's ED over rejection of both offers if (and only if)  $x_E^1 \geq (1 - c_I)^2/2 - 1/8$ .

What would be the maximum compensations that the sellers would be ready to offer to induce  $B_1$  to accept the own exclusivity offer rather than the rival's? In the case of firm  $I$ , the incumbent known that if  $B_1$  signs an ED with it, then entry will not take place and it will make the monopoly profits in both periods, thereby obtaining  $(1 - c_I)^2/2 - x_I^1$ . Instead, if  $B_1$  accepts the entrant's exclusivity offer, entry will take place and the incumbent will make zero profits. Therefore,  $I$ 's maximum offer would be  $x_{I,max}^1 = (1 - c_I)^2/2$ .

Firm  $E$  knows that if  $B_1$  accepts to sign an ED with it, then it will enter the market. It will make the monopoly profits on the first buyer and the duopoly profits on the second buyer. If instead the first buyer accepts the incumbent's exclusivity offer, then the entrant will decide not to enter and will make zero profits. Therefore, the highest offer firm  $E$  is willing to make will be  $x_{E,\max}^1 = 1/4 + c_I(1 - c_I) - F$ .

Putting together the above considerations, the incumbent will be able to lure  $B_1$  to exclusivity if and only if:

$$x_{I,\max}^1 \geq \max \left\{ x_{E,\max}^1 + \frac{1}{8} - \frac{(1 - c_I)^2}{8}, x_{I,\min}^1 \right\}. \quad (2)$$

In other words, the incumbent must make an offer sufficiently large to outbid the entrant's offer and to induce the buyer to prefer exclusivity over rejection of both offers.

It is easy to check that  $x_{I,\max}^1 > x_{I,\min}^1$ . Also,  $x_{I,\max}^1 \geq x_{E,\max}^1 + 1/8 - (1 - c_I)^2/8$  if (and only if)  $F > \tilde{F}(c_I)$ , with  $\tilde{F}(c_I) < c_I(1 - c_I)$  for  $c_I \leq \tilde{c}_I$ . Hence when  $c_I$  is very low the threshold  $\tilde{F}(c_I)$  is below the lowest admissible value of the entry costs, and the incumbent always wins competition for exclusivity. Note that, depending on the value of  $c_I$  and  $F$ ,  $x_{I,\min}^1$  may be larger than the compensation  $x_{E,\max}^1 + 1/8 - (1 - c_I)^2/8$  that allows the incumbent to outbid the entrant. When this is the case, the compensation actually offered by the incumbent in equilibrium amounts to  $x_{I,\min}^1$ .

When, instead,  $x_{I,\max}^1 < x_{E,\max}^1 + 1/8 - (1 - c_I)^2/8$ , it is firm  $E$  that will induce  $B_1$  to accept the exclusivity by offering  $x_E^{*1} = x_{I,\max}^1 - 1/8 + (1 - c_I)^2/8$ . (It is easy to check that  $x_{I,\max}^1 - 1/8 + (1 - c_I)^2/8 > x_{E,\min}^1$ , hence this offer allows firm  $E$  to induce the buyer to prefer its exclusivity offer over the rival's and over rejection of both offers.) ■

**Lemma 3** *At the exclusionary equilibrium, the incumbent is making a profit sacrifice on the first buyer.*

**Proof.** As we have seen above, when the exclusionary equilibrium exists, the equilibrium compensation paid by the incumbent to the first buyer will be:

$$x_{I,\max}^{1*} = \max \left\{ x_{E,\max}^1 + \frac{1}{8} - \frac{(1 - c_I)^2}{8}, x_{I,\min}^1 \right\} \quad (3)$$

$$= \max \left\{ 1/4 + c_I(1 - c_I) - F + \frac{1}{8} - \frac{(1 - c_I)^2}{8}, 3(1 - c_I)^2/8 \right\}. \quad (4)$$

By studying the inequality  $1/4 + c_I(1 - c_I) - F + \frac{1}{8} - \frac{(1 - c_I)^2}{8} \geq 3(1 - c_I)^2/8$  we find that:

If  $F \leq \hat{F}(c_I) \equiv \frac{-12c_I^2 + 16c_I - 1}{8}$ , then  $x_{I,\max}^{1*} = 1/4 + c_I(1 - c_I) - F + \frac{1}{8} - \frac{(1 - c_I)^2}{8}$ ; otherwise,  $x_{I,\max}^{1*} = 3(1 - c_I)^2/8$ .

Suppose  $x_{I,\max}^{1*} = 3(1 - c_I)^2/8$  (which holds if  $F > \hat{F}(c_I)$ ). Since  $B_1$  receives a compensation but pays the monopoly price, the profit made by the incumbent on  $B_1$  will amount to:  $\pi_I^1 = \frac{(1 - c_I)^2}{4} - \frac{3(1 - c_I)^2}{8} < 0$ , that is, there would be a profit sacrifice.

Suppose instead that  $x_{I,\max}^{1*} = 1/4 + c_I(1 - c_I) - F + \frac{1}{8} - \frac{(1 - c_I)^2}{8}$ , which holds when  $F \leq \hat{F}(c_I)$ . In this case, the profit made by the incumbent on  $B_1$  will be:  $\pi_I^1 = \frac{(1 - c_I)^2}{4} - [1/4 + c_I(1 - c_I) - F + \frac{1}{8} - \frac{(1 - c_I)^2}{8}]$ . We can check that  $\pi_I^1 \leq 0$  iff  $F \leq \frac{-11c_I^2 + 14c_I}{8} \equiv F_L(c_I)$ . But recall that in the case we are studying here the condition  $F \leq \hat{F}(c_I)$  holds. It is easy to check that  $F_L(c_I) \geq \hat{F}(c_I)$ , which implies that in the area we are considering it is always true that  $F \leq F_L(c_I)$ . Hence, the incumbent makes a loss on the first buyer. ■

### 6.2.2 Competition with market share discounts

We analyse a game where there are two identical buyers  $B_1$  and  $B_2$ , and each of them will buy two units of a product. We assume that each buyer will buy one unit from the incumbent for sure (e.g., because of switching costs, lock-in effects, or because for a large proportion of final consumers this is a must-buy brand), whereas the second one is contestable, i.e it can be bought from either seller. For simplicity, we assume that for each unit demand is inelastic and with unit valuation. The incumbent and the entrant have marginal costs characterised by  $c_E = 0 < c_I < 1/2$ ; if it enters the entrant has to pay a fixed cost  $F$  with  $c_I < F < 2c_I$ .

We model market share discounts in a very simple way. The incumbent offers each buyer  $i = 1, 2$  a price schedule  $(p_{Ii}, R_i)$  where  $p_{Ii}$  is the price of each unit and  $R_i$  is the discount given if the buyer buys both units. In other words, if buying 50% of its purchase the buyer will pay  $p_{Ii}$  whereas by buying 100% from the incumbent the buyer will pay a total amount of  $2p_{Ii} - R_i$ . The entrant could not offer market share discounts since it would be able to sell at most one unit.

The game is as follows. In the first stage, the incumbent and the entrant simultaneously offer  $B_1$  respectively  $(p_{I1}, R_1)$  and  $p_{E1}$ .  $B_1$  then decides from whom it wants to buy (it can choose to buy both units from I, or one unit from I and the other from E), and finally firm E decides whether it wants to enter, and if so it sinks its entry cost  $F$ . In the second stage, the two suppliers again compete for  $B_2$ 's demand by offering respectively  $(p_{I2}, R_2)$  and  $p_{E2}$ ; then  $B_2$  decides from whom to buy the second unit; and finally, if it had not entered yet, firm E can decide to enter and sink its entry costs.

We prove the following:

**Proposition 4** *There exist a threshold level of the incumbent's marginal cost,  $\tilde{c}_I \equiv 2F/3$ , such that:*

- (i) *If  $c_I \leq \tilde{c}_I$ , then: the first buyer buys both units from the incumbent at a price  $p_{I1} = 1$  but receiving a market share discount  $R = 1 - F + c_I$ ; the second buyer buys both units at the price  $p_{I2} = 1$  (and receives no discount); the entrant does not enter the market.*
- (ii) *If  $c_I > \tilde{c}_I$ , then the entrant enters the market. Both buyers buy one unit from the incumbent at the price  $p_I = 1$  and the second (contestable) unit from the entrant (the first buyer pays the entrant's  $p_{E1} = 2c_I - F$ , while the second buyer pays  $p_{E2} = c_I$ ).*

**Proof.** We proceed by backward induction. At the last stage of the game, when suppliers make price offers to  $B_2$ , we have to distinguish two situations.

If E did not enter at the end of the first stage, then E still has the chance to enter by paying the fixed cost  $F$ . Therefore, its effective marginal cost of providing the contestable unit to  $B_2$  would be  $F$ . Since the marginal cost for the incumbent to supply one unit is  $c_I < F$  the incumbent will just need to set  $p_I - R = F$  in order to get the contestable unit. By profit maximisation, the incumbent will then set  $(p_{I2} = 1, R_2 = 1 - F)$ , where  $R_2 = 1 - F$  is the discount given to buyer  $B_2$  if it buys both units from the incumbent. (The effective price for  $B_2$ 's second unit is  $F$ .) This gives the incumbent a profit  $\pi_{I2} = 1 + F - 2c_I$

If E did enter at the end of stage one, then the entrant will have a marginal cost of supplying the second unit which equals  $c_E = 0$ , which is lower than the incumbent's marginal cost,  $c_I$ . We have the standard Bertrand game with asymmetric costs: the lowest price the incumbent would be willing to offer for the contestable unit is  $p_{I2} - R_2 = c_I$ , which - given that it will find it optimal to set  $p_{I2} = 1$  - will amount to  $R_2 = 1 - c_I$ . At equilibrium, the entrant will match this price and win  $B_2$ 's second unit by setting  $p_{E2} = c_I$ . It will make a profit  $\pi_{E2} = c_I$ , while the incumbent will just get revenue from one unit, thus making  $\pi_{I2} = 1 - c_I$ .

At the first stage of the game, the two suppliers will compete for the second unit of  $B_1$  while anticipating that this will determine the outcome of the rest of the game.  $B_1$  will buy the contestable unit from the incumbent iff  $p_{I1} - R_1 \leq p_{E1}$ . Since the incumbent has no

reason to make discounts on the non-contestable unit and will set  $p_{I1} = 1$ , we can say that  $B_1$  will buy the contestable unit from the incumbent iff  $1 - R_1 \leq p_{E1}$ .

If it wins the contestable unit, firm I will make total profits  $\pi_I = 2(1 - c_I) - R_1 + 1 + F - 2c_I$ , the last three terms representing the expected profits from  $B_2$ . If it loses it, it will make  $\pi_I = 2(1 - c_I)$ , since it will just sell the non-contestable units to both buyers. Therefore, firm I's maximum willingness to discounting is given by  $R_1 \leq 1 + F - 2c_I \equiv \bar{R}$ , which implies that the effective price for the second unit is  $p_{I1} - \bar{R} = 1 - (1 + F - 2c_I) = 2c_I - F$ .

If E wins the contestable unit, it will receive total expected profits  $\pi_E = p_E + c_I - F$  whereas it makes zero profits otherwise. Therefore, the minimum price it is willing to offer is determined by  $p_{E1} \geq F - c_I \equiv \underline{p}_E$ .

The outcome of the competition for the second unit depends on which supplier is willing to offer the lowest price. Hence, the incumbent will win it iff  $p_{I1} - \bar{R} \leq \underline{p}_E$ , or:  $2c_I - F \leq F - c_I$  which amounts to  $c_I \leq 2F/3$ . Obviously, the incumbent will just need to offer a price as low as the entrant's. Therefore, the effective price on the contestable unit at equilibrium will be given by:  $1 - R = F - c_I$ , whence  $R^* = 1 - F + c_I$ .

If instead  $c_I > 2F/3$ , then it is the entrant which wins the contestable unit, by paying a price  $p_{E1}^* = 2c_I - F$ . ■

**Lemma 5** *At the exclusionary equilibrium, the incumbent charges an effective price on the contestable unit of the first buyer which is below marginal cost:  $p_{I1} - R^* = F - c_I < c_I$ . However, it does not make overall losses on the first buyer, since the profit earned on the non-contestable unit outweighs the loss made on the contestable one.*

**Proof.** Below-cost pricing on the contestable unit follows trivially from the above, after recalling that we assumed that  $F < 2c_I$ . Overall profit on the first buyer is demonstrated by noting that the revenue on this buyer is higher than the sum of the cost of supplying both units:  $1 + F - c_I > 2c_I$ , which amounts to  $F > 3c_I - 1$ . This is always satisfied, since under our assumptions  $c_I < 1/2$ , which implies that  $3c_I - 1 < c_I < F$ . ■

### 6.2.3 Competition with two-part tariffs

As above, we assume in this Section that there exist two identical buyers,  $B_1$  and  $B_2$ , whose demand is given  $D(p) = 1 - p$ . Note that it is important that buyers' demand is elastic so as to appreciate the difference between two-part tariffs and linear pricing. The incumbent and the entrant produce the same good and their marginal costs are  $c_E = 0 < c_I < 1/2$ . The entrant has yet to pay a fixed entry cost  $F$  when competition for the first buyer starts, with:

$$\frac{1}{2} - \frac{(1 - c)^2}{2} < F < 2 \left[ \frac{1}{2} - \frac{(1 - c)^2}{2} \right] \quad (5)$$

Differently from the previous analysis, we assume here that the incumbent and the rival compete in two-part tariffs for buyers. More precisely, in the first stage the incumbent and the entrant simultaneously offer  $B_1$  a pricing scheme  $t_j^1(q) = c_j q + T_j^1$  with  $j = I, E$  in which the linear component of the tariff is equal to the supplier's marginal cost, while  $T$  is a lump-sum component.  $T$  may be negative, i.e. it may represent a payment from the supplier to the buyer. The first buyer decides. In the second stage, firm  $E$  decides whether it wants to enter and if so it sinks its entry cost  $F$ . In the third stage, active suppliers offer two-part tariffs to the second buyer:  $t_j^2(q) = c_j q + T_j^2$  with  $j = I, E$ . Assumption 5 on the entry cost ensures that the demand of the second buyer alone is insufficient for the entrant to cover the entry cost, while demand of both buyers is enough. The latter condition also ensures that entry is welfare beneficial.

We can prove the following:

**Proposition 6** If the incumbent can include an exclusivity requirement in the two-part tariff offered to the first buyer, then equilibria are as follows:

- (i) (**Exclusion**) If either  $c_I < 1 - \sqrt{2}/2$  or  $c_I \geq 1 - \sqrt{2}/2$  and  $F > 1 - \frac{3(1-c_I)^2}{2}$ , then firm  $I$  and firm  $E$  offer to  $B_1$  the tariffs  $t_E^1 = F - \frac{1}{2} + \frac{(1-c_I)^2}{2}$  and  $t_I^1 = c_I q + (1-c_I)^2 - 1 + F$ .  $B_1$  buys from the incumbent, then firm  $E$  does not enter the market and the incumbent supplies the second buyer at the tariff  $t_I^2 = c_I q + \frac{(1-c_I)^2}{2}$ .
- (ii) (**Entry**) If  $c_I \geq 1 - \sqrt{2}/2$  and  $F \leq 1 - \frac{3(1-c_I)^2}{2}$ , then firm  $I$  and firm  $E$  offer to  $B_1$  the tariffs  $t_E^1 = \frac{1}{2} - (1-c_I)^2$  and  $t_I^1 = c_I q - (1-c_I)^2$ .  $B_1$  buys from the entrant, then firm  $E$  enters the market and the entrant supplies the second buyer at the tariff  $t_E^2 = \frac{1}{2} - \frac{(1-c_I)^2}{2}$ .

**Proof.** (i) Let us start by the third stage. If firm  $E$  did not enter the market then the incumbent behaves as a monopolist on the second buyer and extracts its entire surplus by setting the tariff  $t_I^2 = c_I q + \frac{(1-c_I)^2}{2}$ . If, instead, the entrant pays the entry cost, then competition for the second buyer results in the incumbent offering  $t_I^2 = c_I q$  and firm  $E$  securing the second buyer by offering the tariff  $t_E^2 = \frac{1}{2} - \frac{(1-c_I)^2}{2}$ . Such an offer allows firm  $E$  to extract from  $B_2$  the additional surplus that its superior technology can generate relative to the incumbent's offer.

In the second stage firm  $E$  decides not to enter the market if the first buyer bought from the incumbent. In fact, by assumption  $F > \frac{1}{2} - \frac{(1-c_I)^2}{2}$  the rents extracted from the second buyer are insufficient to cover the entry cost. If the first buyer addresses firm  $E$ , then firm  $E$  decides to pay the entry cost if the overall rents extracted from the two buyers are large enough:  $\pi_E = T_E^1 + \frac{1}{2} - \frac{(1-c_I)^2}{2} - F \geq 0$ .

In the first stage the two firms compete for the first buyer. The best offer that firm  $E$  is willing to make, compatible with the break-even constraint, is  $T_E^1 = F - \frac{1}{2} + \frac{(1-c_I)^2}{2}$ . By assumption 5, the best offer of firm  $E$  entails a positive lump-sum payment. However, the incumbent has a higher marginal cost than firm  $E$ . Hence, when the two firms supply at their respective marginal cost, firm  $E$  generates a larger buyer's surplus. Then, in order to match the best offer of firm  $E$ , the incumbent must discount firm  $E$ 's lump-sum payment of the amount  $\frac{1}{2} - \frac{(1-c_I)^2}{2}$ , which is the additional surplus produced by firm  $E$  when the suppliers sell at marginal cost. In order to win the first buyer the incumbent must offer a lump-sum payment slightly lower than  $T_E^1 - \frac{1}{2} + \frac{(1-c_I)^2}{2} = F - 1 + (1-c_I)^2$ . Note that, by assumption 5 this payment is negative, i.e. the incumbent is offering a compensation to the first buyer to supply it. Such an offer is profitable for the incumbent if and only if:

$$\pi_I^{TOT} = T_I^1 + T_I^2 = F - 1 + (1-c_I)^2 + \frac{(1-c_I)^2}{2} \geq 0 \Leftrightarrow F > 1 - \frac{3(1-c_I)^2}{2}. \quad (6)$$

Note that if  $c_I < 1 - \sqrt{2}/2$ , then  $1 - \frac{3(1-c_I)^2}{2}$  is below the lower bound of the entry costs identified by assumption 5. Hence, the incumbent manages to exclude for any feasible value of the entry cost. If, instead,  $c_I \geq 1 - \sqrt{2}/2$ , then the entry cost must be large enough. In both cases, the incumbent wins the first buyer, firm  $E$  does not enter and the incumbent sells also to the second buyer.

(ii) If, instead,  $c_I \geq 1 - \sqrt{2}/2$  and the fixed cost is not large enough, then it is firm  $E$  that wins the first buyer by requiring a lump-sum payment which amounts to the incumbent's best offer (i.e.  $T_I^1 = -\frac{(1-c_I)^2}{2}$ ) increased by  $\frac{1}{2} - \frac{(1-c_I)^2}{2}$ . Hence,  $T_E^1 = \frac{1}{2} - (1-c_I)^2$ . Following this offer it is profitable for firm  $E$  to pay the entry cost. Then, firm  $E$  supplies also the second buyer. ■

In this case the reason why inefficient exclusion may arise is the same as in the case in which firms compete for exclusivity, or compete in market-share discounts analysed above. By having lower marginal costs, firm  $E$  produces a larger total surplus as compared to

the incumbent, which favors firm  $E$  when competing for the first buyer. However, the incumbency advantage implies that firm  $E$  cannot extract the entire surplus from the second buyer, whereas the incumbent can when it supplies the second buyer following  $E$ 's decision not to enter the market. This puts firm  $E$  at disadvantage when competing for the the first buyer. If the latter effect is sufficiently strong, the less efficient incumbent wins competition for the first buyer.

**Lemma 7** *At the exclusionary equilibrium the incumbent's tariff  $t_I^1 = c_I q + (1 - c)^2 - 1 + F$  entails a negative lump-sum payment, i.e. a compensation to the first buyer.*

**Proof.**  $T_I^1 = (1 - c)^2 - 1 + F < 0$  by assumption 5. ■

The implication of this lemma is not only that the incumbent needs to suffer losses on the first buyer to exclude. Another implication is that the incumbent needs to impose an exclusivity requirement (or to condition the discount on the buyer purchasing a sufficiently large amount from it). Absent exclusivity, indeed, the buyer would have an incentive to cash in the lump-sum compensation from the incumbent and then buy from the entrant. The incumbent would not be able to exclude the rival.

As a consequence, should the incumbent be unable to impose an exclusivity requirement, then it would have to use a *below-cost* linear pricing to attract the first buyer. This introduces an allocative distortion which limits the incumbent's profitability and makes inefficient exclusion less likely, as the following proposition shows.

**Proposition 8** *If the incumbent cannot include an exclusivity requirement, then it offers a linear tariff to the first buyers and equilibria are as follows:*

(i) (**Exclusion**) *If either  $c_I < 2 - \sqrt{3}$  or  $c_I \geq 2 - \sqrt{3}$  and  $F > 2c_I - c_I^2 - \frac{\sqrt{3}}{4}(1 - c_I)^2$ , then firm  $I$  and firm  $E$  offer to  $B_1$  the tariffs  $t_E^1 = F - \frac{1}{2} + \frac{(1-c_I)^2}{2}$  and  $t_I^1 = (1 - \sqrt{1 - 2F - c_I^2 + 2c_I})q$ .  $B_1$  buys from the incumbent, then firm  $E$  does not enter the market and the incumbent supplies the second buyer at the tariff  $t_I^2 = c_I q + \frac{(1-c_I)^2}{2}$ .*

(ii) (**Entry**) *If  $c_I \geq 2 - \sqrt{3}$  and  $F \leq 2c_I - c_I^2 - \frac{\sqrt{3}}{4}(1 - c_I)^2$ , then firm  $I$  and firm  $E$  offer to  $B_1$  the tariffs  $t_E^1 = \frac{1}{2} - \frac{(1-c_I+\sqrt{3}(1-c_I))^2}{8} > 0$  and  $t_I^1 = \frac{1}{2}(1 + c_I - \sqrt{3}(1 - c_I))q$ .  $B_1$  buys from the entrant, then firm  $E$  enters the market and the entrant supplies the second buyer at the tariff  $t_E^2 = \frac{1}{2} - \frac{(1-c_I)^2}{2}$ .*

(iii) *Exclusion is less likely as compared to the case in which the incumbent can impose an exclusivity requirement.*

**Proof.** (i) In period 1, the linear pricing that allows the incumbent to match firm  $E$ 's best offer must be such that, by buying at such price,  $B_1$  obtains the same surplus as in the case in which it accepts firm  $E$ 's offer:

$$\frac{(1 - p_I^*)^2}{2} = \frac{1}{2} - F + \frac{1}{2} - \frac{(1 - c_I)^2}{2} = 1 - F - \frac{(1 - c)^2}{2}. \quad (7)$$

The above equality is satisfied iff:

$$p_I^* = 1 - \sqrt{1 - 2F - c_I^2 + 2c_I} < c_I \quad (8)$$

Note that such a price is below the incumbent's marginal cost. Hence, the incumbent suffers losses on the sales to  $B_1$ . The surplus extracted from the second buyer dominates such losses, if the following condition is satisfied:

$$\pi_I^{TOT} = (p_I^* - c_I)(1 - p_I^*) + T_I^2 \quad (9)$$

$$= \left(1 - c - \sqrt{1 - 2F - c_I^2 + 2c_I}\right) \left(\sqrt{1 - 2F - c_I^2 + 2c_I}\right) + \frac{(1 - c_I)^2}{2} \geq 0 \quad (10)$$

The above inequality is satisfied iff:

$$F > 2c_I - c_I^2 - \frac{\sqrt{3}}{4}(1 - c_I)^2. \quad (11)$$

Note that if  $c_I < 2 - \sqrt{3}$ , then  $2c_I - c_I^2 - \frac{\sqrt{3}}{4}(1 - c_I)^2$  is below the lower bound of the entry cost identified by assumption 5. In this case, the incumbent profitably wins the first buyer and inefficient exclusion arises for any feasible value of the entry cost. If instead  $c_I \geq 2 - \sqrt{3}$ , then the entry cost must be large enough for exclusion to arise at the equilibrium.

(ii) If  $c_I \geq 2 - \sqrt{3}$  and  $F > 2c_I - c_I^2 - \frac{\sqrt{3}}{4}(1 - c_I)^2$ , then the incumbent cannot profitably match firm  $E$ 's best offer. At the equilibrium the incumbent offers the lowest linear price compatible with the break-even condition, i.e. the price that satisfies the following condition:

$$(p_I - c)(1 - p_I) + \frac{(1 - c_I)^2}{2} = 0 \Leftrightarrow p_I = \frac{1 + c_I - \sqrt{3}(1 - c_I)}{2} < c_I \quad (12)$$

Firm  $E$  wins the first buyer by offering the linear tariff that gives the buyer the same surplus as the incumbent's price, i.e. such that:

$$\frac{(1 - p_I)^2}{2} = \frac{1}{2} - T_E^1 \quad (13)$$

with  $p_I = \frac{1 + c_I - \sqrt{3}(1 - c_I)}{2}$ .

(iii) The critical value of the incumbent's marginal cost below which exclusion is always feasible is larger when the exclusivity provision can be imposed as compared to the case in which the incumbent is forced to use linear pricing:  $1 - \sqrt{2}/2 > 2 - \sqrt{3}$ . Moreover, the critical value of the entry cost above which exclusion is feasible is lower when the exclusivity provision can be imposed as compared to the case in which the incumbent is forced to use linear pricing:  $1 - \frac{3(1 - c_I)^2}{2} < 2c_I - c_I^2 - \frac{\sqrt{3}}{4}(1 - c_I)^2$ . This shows that in the former case exclusion is more likely to arise at the equilibrium. ■