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On the Use of Price-Cost Tests in Loyalty Discounts and Exclusive Dealing Arrangements: Which Implications from Economic Theory?*

Chiara Fumagalli[†] Massimo Motta[‡]

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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, Antitrust Policy

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*, that we broadly define as discounts (which can take different nature and form) given by a supplier to a buyer if the latter satisfies a significant percentage of its requirement from that supplier within a given reference period, or if its orders grow over time according to a certain percentage.¹ This discussion has been motivated by recent cases, such as *Eaton v. Meritor* in the US and the recent *Intel* judgment in Europe, 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).

None the less 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 rival suppliers 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

¹The definition may change across agencies, judges, scholars and commentators. For instance, according to Elhauge (2009), loyalty discounts are agreements to sell at a lower price to buyers who buy *all or most* of their purchases from the seller. Instead, the General Court in *Intel* denotes such discounts as *exclusivity discounts*, whereas loyalty discounts (or fidelity discounts) are those discounts that are not conditioned to exclusive or quasi exclusive supply but in which the mechanism for granting the discount has a fidelity building effect. See Einer Elhauge (2009), "How loyalty discounts can perversely discourage discounting", *Journal of Competition Law and Economics*, 5(2), 189-231. See also, General Court Judgment in Case T-286/09, par. 76,77.

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 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 and the Court of Justice is expected to rule on it next year. 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.² The heavy-duty (HD) 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. 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*³ and, in two cases, to remove Meritor’s products from the data book.

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. The US Court of Appeals for the 3rd Circuit upheld, arguing that in this case *price is not the vehicle of exclusion and hence evidence that prices were above costs does not make the arrangements lawful*.

Indeed, according to the judgment, breaking the relationship with Eaton was a risk that OEMs could not afford: Meritor did not sell the complete range of transmissions needed by OEMs, which made Eaton an unavoidable trading partner. Then, central to the finding that Eaton’s conduct did not rely mainly on pricing is the fact that not all demand was contestable combined with the threat not to supply the OEMs.

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.

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

³Truck 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*.

The decision was not unanimous. In his dissenting opinion Judge Greenberg argued, *inter alia*, that prices were central to the LTAs,⁴ and that “[...] 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.”⁵ (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.

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,⁶ 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.⁷

Eisai v. Sanofi-Aventis.⁸ This case concerns 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 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, since it was estimated to be 17.7 times its costs.

The judge 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 priced below rivals’).

The 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

⁴“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)

⁵Note that the mere threat to stop or limit supply is 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).

⁶Daniel A. Crane et al. “Brief for eighteen scholars as Amici Curiae in support of petitioner”, March 28, 2013.

⁷See 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, containing a number of interesting contributions by authors such as Crane, Lambert, Salop and others.

⁸*Eisai INC. v. Sanofi-Aventis, LLC, et al.*; District Court of New Jersey, March 28, 2014. Civil Action No. 08-4168.

were not credible). She also acknowledges that a portion of the demand could have not been contested by the smaller Eisai, but she argues that Eisai could have competed much more fiercely.⁹ Recently, the US Court of Appeals for the 3rd circuit affirmed the District Court judgment.¹⁰

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.¹¹ Central processing units (CPUs, i.e. the brain of a computer) for the x86 architecture are purchased by original equipment manufacturers (OEMs), who then integrate them into desktops, laptops or servers. 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, and adapted the test 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.¹²

In 2014, the General Court 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, and that “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.”

⁹“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)

¹⁰*Eisai INC. v. Sanofi-Aventis, LLC, et al.*; US Court of Appeals for the Third Circuit, May 4, 2016. Case No. 14-2017.

¹¹Judgment of the General Court of 12 June 2014 in Case T-286/09.

¹²“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.

(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).

Post Danmark A/S v. Konkurrencerådet.¹³ On 6 October 2015, the European Court of Justice handed down its judgment on a case referred to it by a Danish court, which concerned a rebate scheme implemented by Post Danmark, the dominant operator in the postal sector in Denmark (which at the time also had some segments of the market still reserved to it).

Strictly speaking, the rebates at issue are beyond the scope of the paper, since they were not loyalty rebates, but “retroactive standardised rebates”, that is quantity discounts available to any buyer and which just depended on purchasing a certain quantity during a period of one year.¹⁴ Still, the judgment is of interest because it contributes to clarify the stance of European judges towards rebates in general.

The Court says that to determine whether a retroactive standardised rebate infringes article 102, it is necessary to consider all the circumstances of the case, including the criteria for the granting of the rebate, the extent of the dominant position of the defendant, and the conditions of competition prevailing on the market. It also specifies that the as-efficient competitor test is not a necessary condition for finding that a rebate scheme is abusive, but it must be regarded as one tool amongst others in the assessment of the rebate. However, the Court also adds that, in cases such as the one at hand, the as-efficient competitor test is of no relevance, because the dominant firm holds a very large market share and because the structure of the market (including the existence of a statutory monopoly in some segments of the market) would make the emergence of an as-efficient competitor practically impossible. In other words, the Court says that when an inefficient rival exists (and it is unlikely that it can reach efficient scale), a retroactive standardised rebate is abusive even though it results in prices above costs.

Finally, the Court says that in order to establish the abusive nature of the rebate scheme, its effects should be probable, but there is no need to show that the effects are serious or of appreciable nature. This implies that even if a very small part of the buyers were interested by the rebate, this could be enough to determine the abuse. The Court justifies this position by the ‘special responsibility’ of a dominant firm not to impair genuine, undistorted competition, and the fact that when market competition has already been weakened by the presence of a dominant firm, any further weakening of the structure of competition may constitute an abuse.

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 judges argue that economic evidence is irrelevant in evaluating loyalty rebates, because they are inherently restricting competition if used by a dominant firm.

¹³Judgment of the European Court of Justice of 6 October 2015 in case C-23/14.

¹⁴The Court defines as quantity rebates only those rebates which are granted in respect of an individual order, see paragraphs 27-28 of the judgment.

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 analyse whether there is evidence of anticompetitive conduct and effects.

Further:

”[...] 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)

Moreover, Judge Greenberg 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 some 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;^{15,16} (2) the former does not require profit sacrifice in order to exclude while the latter does; and (3) some forms of loyalty rebates are so close to exclusive dealing that they should be treated in the same way.

The remainder of this paper deals with these issues, by both reviewing existing recent theories and developing some new material. To anticipate our views in a nutshell, we 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 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 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

¹⁵See 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.

¹⁶See 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.”

discriminate across buyers.¹⁷ Finally, in Section 5 we discuss the role of the price-cost test within this line of thoughts.

In this respect, even though below-cost pricing (or profit sacrifice) is not the distinctive feature, we want to stress since the beginning that the price-cost test represents a useful and informative tool. The price-cost test, however, should not be interpreted as being necessarily applied across *all* customers and across *all* the units purchased by a given customer. Section 3.2 and Section 4 will highlight that dominant firms may have an incentive to target discounted prices or advantageous contractual terms to *specific buyers*, or to *specific parts of the demand* of customers, with the losses suffered on such customers (or units) being compensated by the higher profits earned, in the same period, on the remaining customers (or units). For instance, dominant firms may offer substantial discounts in exchange for exclusivity only to a subset of their customers, the ones that are critical to exclude the rival; similarly they may use quantity discounts to select specific customers for the discount or market-share discounts to target the discounted price to the contestable demand of their customers. This implies that, as soon as one departs from simple predation (i.e. across-the-board low prices), then the price-cost test should be applied on a customer-by-customer basis and to customers' contestable units. Moreover, profit sacrifice and recoupment need not to occur in sequence, but may well be simultaneous.

Before entering the discussion on those issue, a note of warning on the similarity between exclusive dealing contracts and loyalty (or exclusivity) discounts. Although it may appear that a discount conditional on buying 100% (or most) of the buyer's requirement is equivalent to an exclusive dealing contract, the two differ in an important dimension. Exclusive dealing contracts are (long-term) *bilateral* contracts that involve a *commitment by the buyer* not to purchase from alternative suppliers during a given reference period. This commitment component on the side of the buyer is not present in loyalty (or exclusivity) rebates, which are *unilateral* offers in which it is only the supplier that commits to offer different terms of trade depending on how much the buyer purchases. Differently stated, a buyer that enters an exclusive dealing contract with a supplier cannot purchase from another supplier. Instead, in the case of exclusivity discounts, a buyer can switch at any moment to an alternative supplier, even though it will obviously lose the discount. The commitment on the side of the buyer may be a crucial factor for the incumbent to exclude a more efficient rival. We will discuss this issue in Section 3.2.1.

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

¹⁷As 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.

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,¹⁸ 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 2000,¹⁹ followed by several other authors);²⁰ but also low prices to some early buyers or 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),²¹ price discrimination including various types of rebates (as shown by Karlinger and Motta 2012),²² tying between a monopolised good and a complementary product for which there exists potential competition (Carlton and Waldman 2002),²³ refusal to supply a monopolized input to an independent downstream rival (Fumagalli and Motta, 2016).^{24,25}

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; that the incumbent disposes of non-contestable customers that allow it to fully exploit scale economies and network externalities; or 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.

¹⁸C. Fumagalli, M. Motta and C. Calcagno (forthcoming), *Monopolization. A theory of exclusionary practices*. Cambridge U.P.

¹⁹Rasmusen, 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.

²⁰See 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.

²¹Bolton 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.

²²Karlinger and Motta. 2012. "Exclusionary pricing when scale matters." *The Journal of Industrial Economics*. LX(1): 75-103.

²³See 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.

²⁴Fumagalli C. and M. Motta, "Dynamic Vertical Foreclosure", *mimeo*, 2016.

²⁵Of 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.

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/markets, an incumbent supplier and a new entrant. The new entrant is more efficient than the incumbent if it supplies all the buyers.²⁶ Then, if it enters the market and secures *all* the buyers at the competitive price (i.e., at a price equal to the incumbent's marginal cost), post-entry profits cover the entry costs. However, if the entrant supplies a single buyer (or a limited number of buyers), then the post-entry profits are short of the entry cost. In other words, there exists a minimum number of buyers (larger than one) that the entrant needs to supply to enter the market profitably. The incumbent has already sunk the entry cost, while the entrant has not when the game starts. Importantly, the incumbent 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 (or discount) 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 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.²⁷ In this case the incumbent relies on *coordination failures* to exclude.²⁸

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.²⁹ 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.³⁰ 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.

²⁶It 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.

²⁷There 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.

²⁸If all the buyers could coordinate their decisions, they would reject the exclusive offer of the incumbent and entry would take place.

²⁹Of course, the logic can be extended to the more general case with more than two buyers.

³⁰Of 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.

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.³¹ This conduct is typically denoted as “divide-and-conquer” strategy.

Profit sacrifice also arises in a setting in which buyers are asymmetric.³² 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 or crucial buyer(s). To see the intuition consider again the two-buyer setting. Consider the case in which the incumbent makes offers to all the buyers simultaneously. Now, the incumbent cannot take advantage of buyers’ coordination failures so as to exclude without profit sacrifice. The large buyer, if offered a negligible compensation, will reject exclusivity, even if it expects the other buyer to sign in. The reason is that the large buyer anticipates that its demand alone makes entry profitable so that it will pay the competitive price even if it is the only buyer to reject exclusivity. The unique equilibrium, under simultaneous offers, involves a profit sacrifice for the incumbent that pays a “full” compensation to the large buyer. Similarly, in the case of sequential offers, the large buyer cannot be induced to accept exclusivity behind no compensation. Anticipating that its demand alone makes entry profitable, it will require to be compensated “fully” even if the other buyer has already agreed on exclusivity (or it is expected to do so after its decision). To sum up, even in the sequential case the exclusionary outcome involves profit sacrifice for the incumbent.

We have mentioned at the beginning of this Section that the models described so far feature a strong strategic asymmetry in favor of the incumbent, who makes contract offers before the entrant shows up. What is really crucial for exclusion, though, is that *buyers decide* before the entrant enters the market and can make counteroffers. Imagine, instead, that the incumbent makes the offers first, but buyers do not need to commit to their choice in that moment. *Absent ex-ante commitment on the side of the buyer, the incumbent would not manage to exclude the more efficient rival.* Imagine that the incumbent offers zero compensations (or discounts), as in the cases above in which exclusion does not entail profit sacrifice. If buyers do not decide in that moment, then the entrant would enter the market. It would anticipate that, once entered the market, it could (slightly) undercut any offer that is profitable for the incumbent, and secure all the buyers. Since the entrant is more efficient than the incumbent, at such prices it would make enough profits to cover the entry costs.³³ Similarly, consider the case in which the incumbent offers a generous compensation to the crucial buyers, and no compensation to the remaining ones, as in the divide-and-conquer case described above. If buyers do not commit ex-ante and the deal is overall profitable for the incumbent – because the profit sacrifice suffered on the crucial buyers is compensated by the rents extracted from the remaining buyers – then the more efficient rival can enter the market and make a profitable counteroffer. The general point is that, absent ex-ante

³¹Exclusion is profitable if the losses suffered on the subset of crucial buyers are compensated by the monopoly profits extracted from the remaining buyers.

³²For a formal proof, see the Appendix, Section 6.1.

³³Recall that the assumption of efficient entry implies that the entrant covers the entry cost if it supplies all the buyers at a price equal to the incumbent’s marginal cost.

commitment, in order to discourage entry the incumbent should make an initial offer that the rival cannot profitably match. However, since the rival is more efficient, such an offer would be unprofitable for the incumbent. In other words, in this setting, lack of ex-ante commitment allows buyers to decide when all the offers are on the table which facilitates the rival in making profitable counteroffers and makes it impossible for the incumbent to exploit its first mover advantage so as to deter efficient entry. For this reason, the anti-competitive potential of exclusive dealing contracts and exclusivity (or loyalty) discounts is quite different in this context.³⁴

Another important remark on the anti-competitive role of exclusive dealing contracts concerns the *enforcement of the buyer's obligation not to purchase from other suppliers*. The underlying assumption in the above discussion is that a buyer entering an exclusive dealing contract cannot breach exclusivity (or, equivalently, that breach can occur under the payment of disproportionately high penalties). However, common law systems give contractual parties the option to breach the contract under the payment of *expectation damages*, i.e. damages that are calculated so as to put the other party in the position it would have been in had the contract been performed. The point is that, under expectation damages, long-term exclusive contracts cannot deter efficient entry. The entrant would enter the market even if all the buyers signed the exclusive dealing contract, because it would anticipate that all of them would breach. To see why, imagine that the entrant enters the market and offers a price equal to the incumbent's marginal cost. If the exclusive contract is performed, the buyer pays the monopoly price, and the incumbent earns the monopoly profits. Hence, a buyer that breaches is required to pay expectation damages that amount to the monopoly profits. Due to the monopoly deadweight loss, buying from the entrant at the competitive price and paying such damages gives more surplus to the buyer than paying the monopoly price. Then, each buyer has a unilateral incentive to breach.³⁵ As a consequence, by offering the competitive price the entrant captures all the buyers and manages to cover the entry cost: entry is profitable even if all the buyers had agreed on exclusivity. In turn, since entry occurs irrespective of the number of buyers that initially agreed on exclusivity, the incumbent cannot secure buyers into exclusive dealing contracts in a profitable way.

Note, however, that courts may overestimate the actual damages in the computation of expectation damages. Moreover, expectation damages can be amplified by reputational costs and legal costs. In these cases, damages for breach may be large enough to discourage breaching, and the anti-competitive concern of (long-term) exclusive dealing contracts is restored.

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.

Removing the first-mover advantage hypothesis and allowing a more efficient rival to compete for buyers makes inefficient exclusion less likely. The general idea, again, is that

³⁴For an extensive analysis, see Ide E., J-P. Montero and N. Figueroa. 2015. "Discounts as a Barrier to Entry". Forthcoming in the *American Economic Review*.

³⁵More generally, since entry is efficient, the total surplus of the involved parties (the incumbent, the buyer and the entrant) is larger when entry takes place than in the case in which entry does not occur and the incumbent is a monopolist. Then, even if buyers agreed on exclusivity, the parties can find a mutually satisfactory outcome, whereby the buyers source their supply needs from the entrant and the greater surplus generated by this efficient entry is distributed in such a way that each party is at least as well off as if the entrant had stayed out of the market. The payment of expectation damages is a way to implement efficient *renegotiation*. See Fumagalli C., M. Motta and C. Calcagno (forthcoming), Chapter 3, Section 2.5 for a discussion on the role of renegotiation for the anti-competitive effect of exclusive dealing contracts.

whatever the offer the incumbent makes to buyers the more efficient rival can always make a more favourable counteroffer, thereby hindering exclusion. However, this intuition is not always correct, as we discuss in what follows.³⁶

Suppose that an incumbent and an entrant compete for the exclusivity of two buyers that are approached *sequentially*.³⁷ Initially, the incumbent and the rival offer exclusive dealing contracts to the first buyer, who can accept either exclusive offer, or reject both. Then the entrant decides on entry, which involves sinking a fixed cost. After that, the suppliers offer exclusive dealing contracts to the second buyer. Finally, once contract decisions have been taken, (active) suppliers fix prices consistently with the contracts that have been signed and transactions take place. Note that exclusive dealing contracts involve ex-ante commitment from the buyer: a buyer that has agreed on exclusivity with a supplier, will have the possibility to buy only from that supplier.

In this setting, 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 the market, which decreases total welfare.^{38,39}

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

³⁶For a formal analysis see the Appendix, Section 6.2.1.

³⁷Of course the same results generalize to the more general case with N buyers.

³⁸This 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.

³⁹See 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.

Profit sacrifice is needed when competing for exclusivity. 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 sacrifice profits*. Indeed, the compensation which is offered to the first buyer is such that the incumbent *makes a loss* on it. The argument is the following. Recall that the entrant is more efficient than the incumbent over total production and it covers the entry costs when it supplies both buyers at a price equal to the incumbent's marginal cost. Imagine that the incumbent makes an offer to the first buyer that does *not* involve a loss. Then the entrant could profitably undercut that offer. By so doing, it would secure the first buyer and, later, also the second. Since the initial offer to the first buyer did not involve losses for the incumbent, by undercutting that offer the entrant would earn total profits that are larger than the ones obtained when it supplies both buyers at a price equal to the incumbent's marginal cost, thereby covering the entry costs. Hence, in order to discourage entry, the incumbent must suffer losses on the first buyer so as to limit so much the profits that the entrant makes on the first buyer – if it decides to undercut – that the total profits that the entrant expects to make do not cover the entry cost. Despite the loss suffered on the first buyer, the offer is overall profitable for the incumbent because, as we explained above, when the first buyer agrees on exclusivity, then entry does not take place, and the incumbent will not suffer competition from the rival in supplying the second buyer. This allows the incumbent to extract larger rents than the rival from the second buyer (namely the monopoly rents rather than the post-entry competitive profits) and to cover the initial loss.

Exclusive dealing contracts vs. Exclusivity discounts The timing of the model described above is meant to capture the long-term nature of exclusive dealing contracts which may typically cover several years. Then, firms agree on exclusivity first and, in later periods, all transactions take place. Also *in this setting*, the fact that the contract includes an ex-ante commitment on the side of the buyer is critical for exclusion. The reason is the following. If the first buyer signs the exclusive contract and commits not to buy from alternative suppliers, then the entrant will desist from entering the market, anticipating that the profits earned on the second buyer are insufficient to cover the entry cost. Lack of entry allows the incumbent to make monopoly profits on the second buyer and to cover the initial loss. Absent the ex-ante commitment on the side of the buyer, the entrant would instead enter the market: since buyers decide at the end, when all the offers are on the table, the more efficient entrant would always cover the entry costs by undercutting any offer that is overall profitable for the incumbent.

However, the same mechanism based on the interaction between the incumbency advantage and important scale economies rationalises exclusion of a more efficient rival in situations in which *no long-term contracts* are involved and buyers are approached sequentially. In this environment whether the contract involves an ex-ante commitment on the side of the buyer is not relevant any longer. Indeed, simple linear pricing allows to exclude, as we will discuss next.

Simple linear pricing also achieves exclusion. Consider a setting in which, as above, the incumbent and the rival compete for buyers/markets *in sequence*. However, differently from the previous case, after the suppliers post their offers to a given buyer, the buyer decides from whom to purchase and the transaction takes place. As before, assume for simplicity that there exist two buyers and that the rival has not incurred the entry cost yet when competition for the first buyer starts. Also in this case we maintain the key assumptions of this paper, i.e. that (i) the rival is more efficient than the incumbent if it serves both buyers; hence, it manages to cover the entry cost if it enters the market and supplies both buyers at the competitive price; (ii) the entrant, however, cannot cover the

entry cost if it supplies a single buyer only.

In this setting, imagine that the incumbent and the rival offer simple linear prices. The same argument developed for exclusive dealing contracts explains why, in this context, predation arises at the equilibrium, if the efficiency gap between the incumbent and the rival is not too large.⁴⁰ When competing for the first buyer, each firm realises that who supplies the first buyer will also supply the second one. On the one hand, the incumbent is less cost-efficient than the rival in supplying the two buyers, and this limits its price aggressiveness; on the other hand, the incumbent expects to extract higher revenues than the rival from the second buyer, and this makes it more aggressive. Then, if the overall efficiency advantage of the rival is not too large, it is the incumbent that makes the winning bid for the first buyer, setting a below-cost price that the rival cannot profitably match. Predation will arise at the equilibrium, with the incumbent suffering losses on the first buyer (or, on the early buyer in a more general setting) and recouping losses on the second (later) buyer(s) (who will end up paying a much higher price). Predation will also be welfare detrimental since efficiency would call for the rival firm to serve all the buyers.

Two remarks are necessary. First, a common underlying mechanism, based on an incumbency advantage and on important scale economics rationalises both predation and exclusive dealing contracts. Second, even though the incumbent manages to exclude the more efficient rival by posting simple linear prices, richer contracts – such as conditional discounts or exclusivity discounts – may facilitate exclusion, as we will discuss in the next two paragraphs.

Exclusivity discounts to limit distortions. Bernheim and Whinston (1998) is the first paper to deliver the insight that 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 crucial buyers while introducing fewer distortions on the sales made to them as compared to the case of no exclusivity requirement.

To see this point, consider again the setting described above, with the incumbent and the rival competing for buyers/markets in sequence and with transactions taking place at the end of each period. Imagine that the incumbent and the rival offer two-part tariffs to the buyers.^{41,42}

As we have already discussed, the interaction between the incumbency advantage and the existence of scale economies allows the incumbent to extract more rents than the rival from the second buyer (if it secured the first one), 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. We know that the incumbent suffers losses on the first buyer: with two-part tariffs the winning offer entails a unit price equal to the incumbent's marginal cost and a negative fixed fee, i.e. a payment from the incumbent to the first buyer. For this reason the exclusivity requirement is crucial: without it, the first buyer would cash in the fixed payment by purchasing a negligible amount from the incumbent while buying the rest from the rival. Then, the incumbent would not manage to exclude the rival. As a consequence, should the incumbent be constrained not to include exclusivity requirement in the offer, it would secure the first buyer by fixing a below-cost linear price. This would introduce an allocative distortion in the sales to the first buyer and reduce the incumbent's profits. For this reason inefficient exclusion would be less likely as compared to the case in which the offer can include exclusivity requirements.

⁴⁰See Fumagalli and Motta (2013).

⁴¹Two-part tariffs are simple scheme in which the total price paid by a buyer is composed of a fixed and a variable component.

⁴²See the Appendix, Section 6.2.2 for a formal analysis.

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, 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.

Market-share discounts to target the contestable demand. The setting that we have discussed so far – with the incumbent and the rival competing for buyers in sequence and with transactions taking place at the end of each period – is useful to shed light on another reason why richer contracts, such as market-share discounts, may facilitate exclusion.

Suppose that part of the demand of each buyer is non-contestable by the rival, perhaps because the incumbent's product is a must-have product. For instance, buyers can be thought of as retailers/firms who serve different categories of consumers, some having a strong preference for the incumbent's product, while others considering the rival's product as a substitute of the incumbent's product. As before, the rival has not incurred the entry cost yet when competition for the first buyer starts. Moreover, our key assumptions in this context translate in that the contestable demand of the second buyer is insufficient for the rival to cover the entry cost, while the contestable demand of both buyers is enough.⁴³

As a consequence of these features, the incumbent manages to extract larger rents from the second buyer than the rival. In turn, this puts the incumbent in the position of offering a large discount to the first buyer – *conditional on her 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.

Let us emphasise two important aspects in the above discussion. First, conditionality of the discount plays a critical role, as it allows the incumbent to target the aggressive price offer to the contestable part of the buyer's demand. If the incumbent could not discriminate, exclusion would not occur or it would be less likely to occur because the incumbent should fix a below-cost price also for the captive units demanded by early buyers. Then, the amount of profits that the incumbent should sacrifice so as to exclude would be larger.

Note that, in this setting in which the buyer's demand is certain and common knowledge, what really matters to target the contestable demand is that the buyer qualifies for the discount if her purchases exceed a given threshold. Whether the threshold is expressed in terms of units (quantity discount) or share of total requirement (market-share discount) is irrelevant. If demand, however, is subject to shocks, market share discounts may be more effective than quantity discounts to target the contestable demand.

Second, the discount offered to the first buyer entails that the contestable units are effectively sold below costs. However, on the non-contestable units the price charged to the first buyer may be sufficiently high that there is an overall positive profit out of this buyer. 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 of that buyer. Moreover, the test should compare to cost the appropriate discounted price, i.e. the effective price that the incumbent is fixing for the contestable units, which is the actual price that the rival should match so as to capture the contestable demand. Imagine, for instance, that the conditional discount is a per-unit discount (either expressed as a percentage of a list price, or in absolute terms) that applies

⁴³For a formal analysis see the Appendix, Section 6.2.3.

on all the units that the buyer purchases, as in the case of retroactive rebates. Then the identification of the effective price should allocate to the contestable units the total discount on the non-contestable units that the buyer loses when she addresses the rival and does not qualify for the discount. These remarks are in line with the as-efficient competitor test that is suggested by the Article 102 Guidance Paper of the European Commission and with the test developed by the EC in the *Intel* case.

Entry deterrence vs. barriers to expansion. The mechanism described so far 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/markets, and in which there exist scale economies (but also learning effects, networks externalities, etc. as mentioned at the beginning of Section 3.1) that interact with an incumbency advantage, i.e. with the fact that the incumbent can dispose of larger base of old or captive customers. In this broader environment, even though it is more efficient than the incumbent when it supplies all of the new buyers, the smaller rival needs to achieve a critical scale (or a critical customer base) below which it is poorly competitive. Again, inefficient exclusion may take place, with the rival being relegated to a niche role.

Simultaneous purchases and buyer miscoordination. 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,⁴⁴ or simple across-the-board pricing schemes (see Fumagalli and Motta, 2008,⁴⁵ 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/expansion 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) market demand is fragmented across several buyers.

Downstream competition. Conditional discounts and exclusive dealing contracts involve very often customers that are not end-users; rather, customers are firms that use the input purchased from the incumbent or the rival and turn it into a final product for end-users, or into an intermediate product for other firms. For instance, buyers may be

⁴⁴We have seen that in the model of Segal and 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.

⁴⁵Fumagalli C. and M. Motta. 2008. "Buyers' Miscoordination, Entry and Downstream Competition." *Economic Journal*. 118: 1196-1222.

retailers or OEMs as in the *Intel* or *Meritor* cases described in Section 2. It turns out that the intensity of downstream competition between customers critically affects the scope for exclusion.

The key point is that when downstream competition is sufficiently intense, the demand of a single buyer is sufficient for the rival to cover the entry costs or, more generally, to achieve efficient scale. Then, the fundamental mechanism that leads to exclusion in all the models that we have discussed so far is shut down.⁴⁶

To see why this is the case, consider the setting with strategic asymmetry discussed in Section 3.2.1, in which the incumbent offers exclusive dealing contracts and buyers decide before the entry decision is taken. Imagine that all the buyers but one accepted the incumbent's offer. Imagine also that entry takes place and that the entrant supplies the input to the free buyer at a price that is lower than the incumbent's price for the buyers that accepted exclusivity. In this environment in which downstream buyers compete, using a cheaper input than the rival buyer allows the free buyer to steal part of the rival's business. The more intense downstream competition, the stronger this business-stealing effect and the larger the input demand generated by the free buyer. In the extreme case in which downstream buyers are Bertrand competitors offering homogeneous products, the free buyer will manage to capture the entire downstream market and will demand the amount of input necessary to supply the entire final market. Hence, when downstream competition is sufficiently intense, the demand of the free buyer *alone* is large enough for the upstream rival to cover the entry cost or, more generally, for it to achieve efficient scale. Anticipating this, the rival will enter the market, even though all the buyers but one accepted the incumbent's offer. Then, the incumbent cannot take advantage of coordination failures, of divide-and-conquer strategies, or of the possibility to approach buyers in sequence to secure them into exclusivity in a profitable way. Similarly, in the models without strategic asymmetry discussed in this Section, in which the incumbent and the rival compete for buyers in sequence, intense downstream competition, by making the demand of later buyers sufficient to achieve efficient scale, eliminates the possibility for the incumbent to extract more rents than the rival from later buyers. Then, the mechanism that rationalises inefficient exclusion does not operate any longer.

When, instead, downstream competition is soft – for instance because downstream firms offer products that are highly differentiated either in terms of variety or geographically, or because they operate in industries where capacity constraints are prevalent – the business stealing effect is weak. Hence, in the presence of buyers fragmentation and important scale economies, it is still the case that individual demand is insufficient to attract entry (or to achieve efficient scale) and all the results discussed above hold good.

The conclusion that one can draw from this analysis is that, in situations in which scale economies are important and buyers are fragmented, the different practices that we have discussed so far (from predatory pricing, to loyalty discounts and exclusive dealing contracts) are more likely to be a concern if downstream competition is sufficiently soft. Instead, when downstream competition is intense, the concern raised by such practices is less severe.

However, a qualification is necessary concerning the interaction between downstream competition and the entry-deterrence effect of exclusive dealing contracts. Indeed, under specific industry characteristics, intense downstream competition may facilitate a dominant firm, *that has the possibility to move first*, in securing customers into long-term exclusive dealing contracts that exclude a more efficient rival from the market.

To see the intuition, one must consider that downstream competition affects not only the input demand generated by the (sole) free buyer, but also the profit that the free buyer earns upon rejecting exclusivity (i.e. when it deals with the entrant); this in turn affects the extent to which the incumbent needs to compensate a buyer in order to sign up long

⁴⁶This is the main insight in Fumagalli and Motta (2006).

term exclusive dealing contracts. In this respect the role of downstream competition is not clear-cut.

On the one hand, fierce downstream competition may pass through to final consumers much of the benefit of lower input prices, thereby eroding the profits of the free buyer and making it cheap for the incumbent to induce all of the buyers to sign up.^{47,48} On the other hand, there exist several situations in which the (sole) free buyer may appropriate (some of) the benefits of using a cheaper input, and these benefits are enhanced by more intense downstream competition.⁴⁹ Hence, when the incumbent can move first and offers long-term contracts before the entrant decides on entry, whether intense downstream competition facilitates exclusion depends on specific features of the market that need to be evaluated case-by-case.

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 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.

Moreover, when contracts have a long-term perspective and transactions take place in later periods, the anti-competitive concern of exclusive dealing contracts – which also involve an ex-ante commitment on the side on the buyer – is more severe than the one of exclusivity discounts.

⁴⁷This is the main insight in Simpson and Wicklegren (2007) and Abito and Wright (2008). In this case it is in the joint interest of the incumbent and the downstream buyers to agree upon exclusivity. By preventing entry, this limits upstream competition and keeps final prices high, thereby allowing to extract more rents from final consumers and increasing the surplus available to the firms for signing the contract.

⁴⁸In the same vein, downstream competition facilitates exclusion if the incumbent can offer contractual conditions to a buyer that are contingent on the behaviour of the other buyers. For instance, the dominant firm could commit to match the price offered by the upstream rival to the buyer that rejected exclusivity. When downstream competition is tough, this reduces substantially the profits that the free buyer would expect to earn in the downstream market and makes it cheap for the incumbent to secure all the buyers into (long-term) exclusive dealing contracts.

⁴⁹This is the case, for instance, if the efficiency gap between the entrant and the incumbent is large enough, or if free buyer has some bargaining power in negotiating with the entrant and manages to extract some of the surplus created when entry takes place. See Johnson J. 2012. “Adverse Selection and Partial Exclusive Dealing.” *Mimeo*.

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. Staggered expiry dates gives rise to a situation in which the incumbent can approach buyers sequentially and, therefore, in which exclusion can occur without profit sacrifice (see the discussion of Segal and Whinston (2000) in Section 3.2.1). Moreover, Cabral (2014) shows that staggered expiry dates favor exclusion also when the rival has the possibility to make offers at the moment of contract renewal. 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 (overall) efficiency advantage and allow the incumbent to always win competition for the contracts to be renewed.⁵⁰

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.

We have discussed in Section 3.2.2 the seminal contribution by Bernheim and Whinston (1998), which is the first paper to deliver the insight that exclusivity discounts may increase the scope of exclusion by limiting the amount of profits that the incumbent needs to sacrifice so as to exclude. We have also discussed the role of market-share discounts for targeting the contestable part of demand, thereby making exclusion more profitable for the incumbent also through this channel.

More recently, other papers lead to the same conclusion that contracts that reference rivals raise more severe anti-competitive concerns, even though they rely on a mechanism which is completely different from the one we have referred to so far.

For instance, Calzolari and Denicoló (2013, 2015) consider a *one-period* model of price competition, in which the distinct feature of the dominant firm is not the incumbency advantage, as we have assumed so far; rather dominance stems from a competitive advantage vis-à-vis the rival, in the form of higher quality of the product of lower cost.⁵¹ Moreover, these papers rely on a mechanism which is different from that we have highlighted so far, based on the idea that loyalty rebates (and other practices) may be used by the dominant firm to deprive the rival of the crucial scale it needs to be viable. The key reason why exclusivity rebates may turn out to be anti-competitive is *imperfect rent extraction*, namely the fact that the dominant firm cannot fully extract the buyers' surplus by means of non-linear contracts, for instance through fixed fees. Imperfect rent extraction may arise because the buyers' surplus is private information and suppliers do not know exactly how large it is, or it may be due to buyers being risk (or loss) averse.⁵²

⁵⁰Cabral L. 2014. "Staggered Contracts, Market Power, and Welfare". CEPR Discussion Paper No. DP10095. Available at SSRN: <http://ssrn.com/abstract=2501568>.

⁵¹Under the standard assumption that the rival is more efficient than the incumbent (the dominant firm), one would expect that the more efficient rival manages to operate successfully in the market. Then, if exclusion occurs, it must be that other asymmetries between the dominant firm and the rival produce an advantage for the former. The purpose of the literature is to identify such asymmetries (for instance, an incumbency advantage, a strategic advantage, etc.) and the mechanisms through which they allow the dominant firm to exclude the more efficient rival. In the papers we are discussing in this section, the dominant firm has superior quality or uses a superior technology. In a sense, dominance is benign. None the less, these papers show that exclusivity rebates can be used by the dominant firm for anti-competitive purposes.

⁵²Calzolari G. and V. Denicoló. 2013. "Competition with exclusive contracts and market-share discounts."

Imagine that the buyer's willingness to pay is private information. Then suppliers find it optimal to introduce a distortion in the contract designed for buyers with low willingness to pay so as to extract more surplus from buyers with high willingness to pay while inducing them to reveal their type. When contracts cannot reference rivals, the distortion consists of reducing sales to low-type buyers below the efficient level, for instance by fixing a marginal price above costs. Such a distortion facilitates rent extraction from high-demand buyers because they lose a considerable amount of surplus when they have to reduce their purchases. However, the distortion reduces the supplier's profits. A more profitable way to extract surplus from the high-valuation buyers is to deal in exclusivity with low-demand buyers. Since buyers have a preference for variety, a high-demand buyer suffers a significant loss if constrained to purchase from a single supplier. Then, the introduction of contractual exclusivity facilitates rent extraction from high-demand buyers with the advantage that the distortion reduces the *rival's sales* to low-demand buyers, *not own sales*. Indeed, own sales to low-demand buyers increase under exclusivity, if suppliers offer (imperfect) substitute products. This gives the incentive to the suppliers to introduce even more distortions, by involving a larger set of buyers into exclusivity.

Now, let us add suppliers' competition to the picture. When the asymmetry between the dominant firm and the rival is large, because the quality/efficiency gap between them is large, the dominant firm does not suffer much competitive pressure from the rival. Then, the dominant firm must not concede a large discount to make a buyer purchase in exclusivity. In this case contractual exclusivity (or more generally market share discounts) benefits the dominant firm but harms total welfare – as compared to the case in which contracts cannot reference rivals – because buyers suffer from a larger distortion, and such a distortion is absorbed by the rival whose access to low-demand buyers is foreclosed. When, instead, the asymmetry between the dominant firm and the rival is limited, the introduction of exclusivity intensifies competition. Absent exclusivity, firms compete for marginal units of a buyer, and the presence of product differentiation makes competition softer. Instead, with exclusivity firms compete for the entire requirement of a buyer. The presence of some differentiation between the suppliers' products does not matter for the outcome of competition, what matters is the amount of rents that each supplier is able to leave to that buyer. This makes competition tougher, and equilibrium prices and profits lower, as compared to the case in which contracts do not reference rivals. Then, exclusivity discounts exert a pro-competitive effect when asymmetry between suppliers is limited.⁵³

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 buyer, who ex-post has an incentive to purchase inefficiently many units from the incumbent

The American Economic Review. (103) 2384-2411. Calzolari G. and V. Denicoló. 2015. "Exclusive contracts and market dominance." The American Economic Review. (105) 3321-3351.

⁵³In this case, firms' profits are higher absent exclusivity. However, each firm has a unilateral incentive to introduce it. As a consequence, they end up both offering exclusivity and earning lower profits.

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.⁵⁴

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. As we have already discussed in Section 3.2.1, 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.^{55,56} 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.⁵⁷ 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

⁵⁴Choné P. and L. Linnemer. 2014. "Nonlinear pricing and exclusion: I. Buyer opportunism". *Rand Journal of Economics*, forthcoming.

⁵⁵Innes, R. and R.J. Sexton. 1993. "Customer coalitions, monopoly price discrimination and generic entry deterrence." *European Economic Review*. 37: 1569-97.

⁵⁶Innes 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.

⁵⁷Their 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, Section 4.2 of C. Fumagalli, M. Motta and C. Calcagno (forthcoming), *Monopolization. A theory of exclusionary practices*. Cambridge U.P.

the aggressive price offers, and hence the stronger the exclusionary effect.⁵⁸

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 in a counterfactual. Since counterfactual profits are difficult to measure, 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 contracts. 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

⁵⁸Chapsal (2013) shows that the same exclusionary mechanism based on scale economies also applies to 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.

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 demand if exclusivity is not met? Is the threat credible? Is downstream competition between buyers intense?

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.⁵⁹

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.⁶⁰

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,⁶¹ 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).

⁵⁹Under 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.

⁶⁰Suppose 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 pages 14 and 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.

⁶¹To 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.

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).

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.^{62,63} ■

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:

⁶²In terms of payoffs, the equilibria in which the first buyer accepts under a zero compensation and the one in which it rejects are equivalent.

⁶³Whether the large buyer is approached first or second is irrelevant for the result.

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 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 $p_I^n = (1 + c_I)/2$ 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 $p_E^n = 1/2$ and obtains surplus $1/8 + x_i^i$. Firm E makes profits $1/4 - x_i^i$. 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^n 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 $x_E^* = x_{I,max}^1 - 1/8 + (1 - c_I)^2/8$. (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: $\pi_I^1 = \frac{(1 - c_I)^2}{4} - \left[1/4 + c_I(1 - c_I) - F + \frac{1}{8} - \frac{(1 - c_I)^2}{8} \right]$. 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 $F_L(c_I) \geq \widehat{F}(c_I)$, 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 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 4 *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 5 *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 6 *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:

$$\begin{aligned} \pi_I^{TOT} &= (p_I^* - c_I)(1 - p_I^*) + T_I^2 \\ &= \left(1 - c - \sqrt{1 - 2F - c_I^2 + 2c_I}\right) \left(\sqrt{1 - 2F - c_I^2 + 2c_I}\right) + \frac{(1 - c_I)^2}{2} \geq 0 \end{aligned} \quad (9)$$

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. ■

6.2.3 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 lump-sum discount given if the buyer buys both units. The entrant offers the price p_{Ei} to buyer $i = 1, 2$: it does not need to offer conditional discounts as it only competes for the contestable unit of each buyer.

It follows that buyer B_i pays the total price $2p_{Ii} - R_i$ if she buys both units from the incumbent, and the total price $p_{Ii} + p_{Ei}$ if she buys the contestable unit from the entrant. She will address the entrant (if and only if) $p_{Ei} \leq p_{Ii} - R_i$, where $p_{Ii} - R_i$ is the incumbent's effective price for the contestable unit, i.e. the price that the rival has to match so as to secure the contestable unit.

The price schedule offered by the incumbent can be interpreted in different ways: for instance, as a quantity discount whereby the buyer needs to buy (strictly) more than one unit to qualify for the discount; or as a market share discount, whereby the buyer needs to purchase (strictly) more than 50% of her requirement from the incumbent to qualify for the discount; or as an exclusivity discount, whereby the buyer needs to purchase all of her requirement from the incumbent to qualify.

Whatever the form, the point is that in this environment conditionality allows the incumbent to discriminate the price across different units and to target the discount to the contestable part of buyers' demand. Moreover, note that in order to properly compute the effective price, one should allocate to the contestable units the *entire* discount that the buyer loses when she addresses the rival and does not qualify for the discount. If the discount is expressed as a lump-sum discount as in this case, the total discount lost is R_i and the effective price is $p_{Ii} - R_i$. An equivalent discount scheme would be the one in which a unit discount (or a percentage discount) is applied to the incremental units exceeding the threshold. In this simple example with two total units, the incremental per-unit discount would amount to R_i (or to $R_i/p_{Ii}\%$) if the buyer buys more than one unit from the incumbent, or more than 50% of her requirement. Another equivalent discount scheme might be retroactive so that, once the buyer qualifies for the discount, the discount is applied to all the units that the buyer purchases from the incumbent. In this case, a retroactive discount equivalent to the previous ones would be such that the unit discount $R_i/2$ (or $R_i/2p_{Ii}\%$) applies to both units if the buyer purchases more than one unit from the incumbent, or more than 50% of her requirement. Under such a retroactive rebate scheme, the total discount that the buyer would lose by addressing the rival is indeed $2(R_i/2) = R_i$ and this is the discount that should be allocated to the contestable units to correctly identify the effective price.

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 7 *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 $R_1^* = 1 - F + c_I$; the second buyer buys both units at the price $p_{I2}^* = 1$ and receives a discount $R_2^* = 1 - F$; 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. The incumbent can govern the effective price for the contestable units through the choice of the discount R_i . Hence, it is optimal for the incumbent to fix $p_{I1}^* = p_{I2}^* = 1$ and extract the entire surplus that buyers derive from the non-contestable units. The effective price for the contestable unit of buyer i is, then, $1 - R_i$.

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 marginal cost of providing the contestable unit to B_2 is F . Since the marginal cost of the incumbent is $c_I < F$, at the equilibrium the incumbent secures the contestable unit of B_2 by setting the effective price $1 - R_2^* = F$. the discount offered to B_2 is, then, $R_2^* = 1 - F$.

If firm E did enter at the end of period one, then its cost to supply the contestable unit to B_2 equals $c_E = 0$, which is lower than the incumbent's marginal cost, c_I . At equilibrium, the entrant wins B_2 's contestable unit by setting $p_{E2}^* = c_I$.

At the end of the first period, firm E takes the entry decision. If B_1 choose the incumbent, then firm E anticipates that the revenues it can collect from B_2 are insufficient to cover the entry cost: $c_I < F$. Then it decides not to enter the market.

If B_1 chose to buy from firm E , then entry is profitable if the revenues collected in the first period together with the ones that firm E anticipates to obtain in the second period are large enough to cover the entry cost: $p_{E1} + c_I \geq F$.

At the beginning of the first period, the two suppliers compete for the contestable unit of B_1 . The minimum price at which firm E is willing to supply B_1 is $\tilde{p}_{E1} = F - c_I$. The minimum effective price that the incumbent is willing to offer for B_1 's contestable unit is $1 - \tilde{R}_1 = 2c_I - F$: if the incumbent supplies B_1 's contestable unit, then entry will not follow and the incumbent's total profits amount to $2 - R_1 - 2c_I + 2 - 1 + F - 2c_I$; if the entrant supplies B_1 's contestable unit, the incumbent sells only the non-contestable units making total profits equal to $2 - 2c_I$.

The incumbent manages to win the contestable unit of the first buyer if (and only if) $2c_I - F \leq F - c_I$, i.e. if (and only if) $c_I \leq 2F/3$. When this condition is satisfied, at the equilibrium the incumbent's effective price for the first buyer is $1 - R_1^* = F - c_I$ which entails a discount $R_1^* = 1 - F + c_I$. If instead $c_I > 2F/3$, then it is the entrant that wins the contestable unit of the first buyer by offering the equilibrium price $p_{E1}^* = 2c_I - F$.

■

Lemma 8 *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 $F < 2c_I$. Total profits on the first amount to $2 - R_1^* - 2c_I = 1 + F - 3c_I$, which is positive if (and only if) $F > 3c_I - 1$. This condition is always satisfied, since under our assumptions $c_I < 1/2$, which implies that $3c_I - 1 < c_I < F$. ■