Buyer Power and Exclusion: A Progress Report*

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Abstract

This article presents recent advances in the analysis of buyer-seller networks, with a particular focus on the role of buyer power on exclusion. We first examine simple vertical structures and highlight that either upstream or downstream firms may have incentives to engage in exclusionary practices to either counteract or leverage buyer power. We then review current work attempting to revisit this issue in "interlocking relationships". Based on an ongoing research project, we show that the same exclusion mechanisms arise when retail substitution is soft.

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1 Introduction

In a large number of industries, manufacturers deal with retailers (or intermediaries) to access final consumers.[1] Understanding how bilateral agreements are formed in such vertical structures is of great interest to policymakers as it determines product variety,

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[1]Prominent examples include the supermarket industry, the healthcare sector, the pharmaceutical industry, the cable television market, or the car industry.

prices, and ultimately welfare. In this context, the role of buyer power which refers to the ability of retailers to influence the formation of trading relationships and terms of trade with manufacturers has attracted considerable attention among scholars and antitrust practitioners these last decades.[2]

This article reviews recent advances in the analysis of buyer-seller networks from simple to complex vertical market structures, with an emphasis on the potential exclusionary effects of buyer power. Most of the models that we introduce share the common assumption that the buyer-seller network is formed before negotiations take place. We distinguish two types of exclusionary practices: (i) exclusivity clauses whereby a firm requires to be the exclusive trading partner in the vertical relationship (single branding or exclusive dealing), and (ii) restriction of resources whereby a firm strategically restricts its (production or distribution) capacity which, in turn, limits the set of its trading partners. We highlight that most theories presented in this review concur on a unifying message along which exclusionary practices are used either to leverage or counteract buyer power, which leads to inefficient distribution networks. In particular, restriction of resources is used by a firm with limited bargaining power to strengthen its bargaining leverage, while buyer power facilitates the emergence of exclusivity clauses (either imposed by a manufacturer or a retailer).

To capture the main essence of each theory in a simple and concise way, we develop numerical examples where, for any given set of trading relationships, the profits generated by retailers are taken as primitives of the analysis. While this allows us to abstract away from specifying a particular demand system, it is worth noting that most articles discussed in our review illustrate their results using demand systems in which consumers have a taste for variety, implying that exclusion always harms consumers.

For the sake of conciseness, we do not review the literature studying the effect of market structure changes (e.g., horizontal or vertical mergers) on buyer-seller networks.[3] We also rule out incomplete information environments which are a source of in-

[2]See, e.g., OECD (2008), Inderst and Mazzarotto (2008), the market investigation by the Competition Commission (2008) as well as the Symposium on "Buyer Power and Antitrust" released in the Antitrust Law Journal in 2005 (Vol. 72, No. 2).

[3]See, e.g., Smith (2016) for a recent literature review of settings with complete information and Loertscher and Marx (2019*a*,*b*, 2022) for recent contributions in incomplete information settings.

efficient contracting (double-marginalization) that often leads to exclusionary practices (e.g., Choné and Linnemer, 2016; Calzolari, Denicolò and Zanchettin, 2020; de Cornière and Taylor, 2021).[4]

The remainder of this article is organized as follows. Section 2 examines the role of buyer power on exclusion in simple vertical structures, namely markets with a monopoly either upstream or downstream and competing vertical chains. Section 3 extends the analysis to vertical structures involving "interlocking relationships", that is when manufacturers distribute their products through the same competing retailers.

2 Simple vertical structures

In this section, we examine the exclusionary effects of buyer power in simple vertical structures such as triangle structures in which a monopoly operates in one side of the market or competing vertical chains.

2.1 Upstream exclusion

We first analyze exclusion in a triangle structure with two upstream manufacturers, denoted by M_i with $i = A, B$, and one downstream retailer, R. M_A produces good H and M_B produces good L. The profit generated by R is given by $\Pi^{HL} = 7$ when both H and L are offered on the market, $\Pi^H = 5$ when only H is offered on the market, and $\Pi^L = x \in (2, 5]$ when only L is offered on the market.[5] Hence, H and L tend towards independent goods as x approaches 2 and more imperfect substitutes as it tends towards 5. Product H generates more profit than L but they become symmetric when $x = 5$.

Assortment restriction as a bargaining leverage. We first examine the product assortment offered by R on the market and show that exclusion may arise for a buyer

[4]We refer to Fumagalli, Motta and Calcagno (2018) and Calzolari and Verboven (forthcoming) for comprehensive reviews of such alternative exclusion mechanisms.

[5]The fact that H and L generate different industry profits may be due to cost differences, quality differences, or a combination of both.

power motive. To this end, we consider the following two-stage game based on Ho and Lee (2019):

1. R publicly announces its product assortment (i.e., with which manufacturer(s) to form a trading relationship).

2. Bilateral negotiations over fixed fees take place. If R deals with both manufacturers, negotiations are simultaneous and secret.

We use the "Nash-in-Nash with Threat of Replacement" (NNTR) bargaining solution developed by Ho and Lee (2019) to determine trading terms in stage 2, where α denotes the bargaining weight of R vis-à-vis manufacturers. This surplus division rule directly extends the "Nash-in-Nash" (NiN) bargaining solution (Horn and Wolinsky, 1988) by allowing R to threaten to replace each of its trading partners with a product remaining outside its assortment during negotiations.[6] More specifically, while the NiN bargaining solution assigns each manufacturer a share $1-\alpha$ of its marginal contribution to the retailer's profit, the NNTR bargaining solution introduces a cap on the NiN tariffs due to R's threat of replacement.

Consider first the case in which R selects the product assortment $\{H, L\}$. As R deals with both manufacturers, it cannot threaten any manufacturer of replacement and the NNTR solution thus coincides with the NiN solution. Each manufacturer receives a fraction $1-\alpha$ of its marginal contribution to the industry profit: M_A gets $\pi_A^{HL} = (1-\alpha)(7-x)$, M_B gets $\pi_B^{HL} = (1-\alpha)2$ and R gets $\pi_R^{HL} = 7-(1-\alpha)(9-x)$.[7]

Consider now the case in which R selects only one product in its assortment. Let us further consider that this product is H.[8] According to the NNTR solution, M_A

[6]In contrast to the NiN solution, the NNTR solution is particularly appealing to study R's product assortment decision as products remaining outside its assortment may influence equilibrium trading terms. As discussed in Ho and Lee (2019), the NNTR solution directly relates to the literature on bargaining with outside options (e.g., Shaked and Sutton, 1984; Binmore, 1985; Binmore, Shaked and Sutton, 1989).

[7]Formally, the division of surplus in each bilateral negotiation is determined according to the (asymmetric) Nash bargaining solution given that the other pair of firms comes to an agreement. For instance, the bilateral negotiation between R and M_A over the fixed fee of product H is derived from the following maximization problem: $\max_{F_A^{HL}} \left(7 - F_A^{HL} - F_B^{HL} - (x - F_B^{HL})\right)^{\alpha} \left(F_A^{HL}\right)^{1-\alpha}$.

[8]Following Ho and Lee (2019), we only apply the NNTR solution to stable buyer-seller networks, which requires that each manufacturer engaged in a bilateral negotiation with R generates greater surplus than any other manufacturer used as a replacement threat. Otherwise, R would prefer to

receives the minimum between (i) a fraction $1-\alpha$ of its marginal contribution to the industry profit and (ii) the surplus that would make R indifferent between keeping H in its assortment or replacing it with L at M_B's reservation tariff. As M_B has no alternative trading partner, it is ready to offer its product L to R at a reservation tariff of 0. M_A, M_B and R thus respectively get $\pi_A^H = \min\{(1-\alpha)5, 5-x\}$, $\pi_B^H = 0$ and $\pi_R^H = \max\{\alpha 5, x\}$.[9] R's replacement threat thus imposes a cap on M_A's tariff for H. In other words, the threat of replacement is credible only when $\alpha < \frac{x}{5}$ and, when binding, guarantees R a minimum profit of x.

Comparing R's profit under each product assortment, we obtain the following proposition:

Proposition 1 *A monopolist retailer excludes a manufacturer's product from its assortment to use it as a replacement threat in its bargaining with another manufacturer when buyer power is weak:* $\alpha_E > \alpha$, *where* $\alpha_E \equiv \frac{2}{9-x}$.

The intuition for this result is as follows. When R has full buyer power ($\alpha = 1$) it naturally selects the assortment that generates the highest industry profit, that is $\{H, L\}$. In contrast, absent buyer power ($\alpha = 0$), R's profit equals $x - 2$ if it selects the assortment $\{H, L\}$ whereas it cannot be less than x if it selects only H. As a result, R has an incentive to exclude M_B and use its product L as a replacement threat to strengthen its bargaining leverage with respect to M_A when buyer power is weak ($\alpha_E > \alpha$). Note that α_E increases with x and tends to $\frac{1}{2}$ when products are symmetric ($x = 5$) because the threat of replacement is the most powerful in that case.

The exclusion mechanism highlighted in Proposition 1 has been uncovered in alternative settings. For instance, Marx and Shaffer (2010) show that a similar result obtains when R is able to auction off a limited number of slots before negotiating terms of trade sequentially with manufacturers. Chambolle and Molina (forthcoming) replicate the result of Proposition 1 in a similar setting with competition for slots

terminate a relationship with one manufacturer by replacing it with an alternative one that generates a greater surplus. In our case, $R - M_A$ is the unique network satisfying this stability condition.

[9] The bilateral negotiation between R and M_A over the fixed fee of good H can formally be derived from the following maximization problem: $\max_{F_A^H} \left(5 - F_A^H\right)^{\alpha} \left(F_A^H\right)^{1-\alpha}$ subject to $5 - F_A^H \geq x - f_B$, where the constraint reflects that R's gains from trade must at least be equal to what it would obtain by replacing H with L at M_B's reservation tariff $f_B = 0$.

and simultaneous secret bilateral negotiations. The same result also arises in Liebman (2018) who considers a Rubinstein-type (1982) bargaining game in which, upon rejecting R's offer, a manufacturer may be randomly replaced by one of its rivals. It is worth mentioning that these "network formation and bargaining" models share the assumption that R is able to pre-commit to negotiate with a particular number of manufacturers.[10]

Upstream exclusive dealing. We now examine a related setting in which exclusion results from the manufacturers' rather than the retailer's strategy following the two-stage game developed by Chambolle and Molina (forthcoming):

1. Each manufacturer decides whether or not to impose an exclusive dealing requirement on R. Then, R publicly announces its assortment of product(s).

2. Bilateral negotiations over fixed fees take place. If R deals with both manufacturers, negotiations are simultaneous and secret.

Again, we rely on the NNTR bargaining solution to determine the division of surplus in stage 2. To determine M_A's optimal selling strategy in stage 1, we compare its profit under exclusive dealing, that is $\pi_A^H = \min\{(1-\alpha)5, 5-x\}$, and absent exclusive dealing, that is $\pi_A^{HL} = (1-\alpha)(7-x)$.[11] We obtain the following proposition:

Proposition 2 *A manufacturer imposes exclusive dealing on a monopolist retailer when buyer power is large: $\alpha > \alpha_{ED}$, where $\alpha_{ED} \equiv \frac{2}{7-x}$.*

The intuition for this result is as follows. When M_A imposes exclusive dealing, R is restricted to selecting only H in its assortment. In this case, R's bargaining position relative to the situation absent exclusive dealing is weakened because it can no longer leverage the profit that it gets from product L to increase its status quo position in its

[10] Ghili (2022) considers a framework that does not involve any pre-commitment assumption and where bargaining takes place in a spirit similar to the NNTR solution. More precisely, he relies on the notion of pairwise stability (Jackson and Wolinsky, 1996) which implies that any trading relationship that generates positive gains from trade for both parties must form before bargaining starts. Assuming that R incurs fixed costs for including a product in its assortment, he finds that exclusion arises due to a lack of scale economies rather than buyer power.

[11] As we apply the NNTR solution only to stable buyer-seller networks, it is straightforward that M_B has no incentive to impose an exclusive dealing requirement on R.

Table 1: Profits generated by each retailer

R_1 \ R_2	H	L	$\emptyset$
H	(3,3)	(4,$\frac{3}{2}$)	(5,0)
L	($\frac{3}{2}$,4)	(2,2)	(3,0)
$\emptyset$	(0,5)	(0,3)	(0,0)

bargaining with M_A. Moreover, when buyer power is large, R's threat of replacement is not credible implying that M_A obtains $(1-\alpha)5$ under exclusive dealing. As M_A obtains $(1-\alpha)(7-x)$ absent exclusive dealing, it is straightforward that exclusive dealing is always profitable in this case. When instead buyer power is limited ($\frac{x}{5} > \alpha$), R's threat of replacement is credible and M_A's profit is now capped to $5-x$ under exclusive dealing. In this case, exclusive dealing is profitable only when $\frac{x}{5} > \alpha > \alpha_{ED}$. Finally, absent buyer power ($\alpha = 0$), exclusive dealing is never profitable which is in line with the Chicago School critique.

Proposition 2 thus complements the exclusion mechanism of Proposition 1 by highlighting that buyer power facilitates the emergence of anticompetitive exclusive dealing. This result contributes to the long-standing antitrust debate on exclusive dealing by showing that the Chicago School argument is no longer valid when buyer power is large.

Differentiation of suppliers as bargaining leverage. In what follows, we examine the strategic incentive of a retailer to differentiate from its rival by not trading with the same manufacturer for a buyer power motive. Following Chambolle and Villas-Boas (2015), we consider that M_A and M_B may respectively distribute H and L through two symmetrically differentiated retailers, denoted by R_j with $j = 1, 2$, which compete on the downstream market. By assumption, each retailer is single sourcing. Table 1 displays the profit generated by each retailer for all possible market configurations.[12] Note that the efficient assortment for the industry is such that each retailer offers H, which is what retailers would do if they had the entire bargaining power.

[12] These reduced-form profits summarize the rivalry between retailers and are consistent with various forms of competition (e.g., quantity or price competition with differentiated products).

We consider the following two-stage game:

1. Retailers simultaneously and publicly announce their assortment of products.

2. Bilateral negotiations over fixed fees take place. If both retailers deal with the same manufacturer, negotiations are sequential.

Terms of trade are determined according to the sequential bargaining game introduced by Stole and Zwiebel (1996).[13]

There are two cases to consider.[14] Consider first that both R_1 and R_2 select H in their assortment. As both retailers bargain with M_A, the latter has a positive status-quo profit which amounts to what it would obtain in its bilateral renegotiation with one retailer after a public bargaining breakdown with its rival, that is $(1-\alpha)5$. In equilibrium, each retailer obtains $\pi_j^{HH} = \frac{\alpha}{1+\alpha}(6-(1-\alpha)5)$.[15] Consider now that retailers differentiate their product assortment. For instance, R_1 selects L while R_2 still selects H. In this case, there are two competing vertical chains in which each retailer negotiates with a different manufacturer. Thus, each retailer obtains a share α of the joint profit generated with its manufacturer, that is R_1 gets $\pi_1^{HL} = \frac{3}{2}\alpha$ and R_2 gets $\pi_2^{HL} = 4\alpha$. Comparing π_1^{HH} and π_1^{HL}, we obtain the following proposition:

Proposition 3 *Each retailer sources from a different manufacturer than its rival when buyer power is low: $\alpha_D > \alpha$, with $\alpha_D \equiv \frac{1}{7}$. This leads to an inefficient product assortment.*

The result of Proposition 3 establishes that the differentiation of suppliers may be a source of bargaining leverage. The logic is as follows. When buyer power is

[13] This bargaining game can be described as follows. Firms assign distinct delegated agents to each bilateral negotiation. Each pair of delegated agents negotiates trading terms sequentially and secretly according to the Nash bargaining solution. In the event of a bargaining breakdown between one pair, the other pairs renegotiate "from scratch" following the same sequence of negotiations. As shown in de Fontenay and Gans (2014), this model yields the same outcome as the bargaining protocol of Inderst and Wey (2003) in which bilateral negotiations take place simultaneously over trading terms that are contingent on the set of successful bilateral negotiations.

[14] Chambolle and Villas-Boas (2015) have shown that the case in which both retailers select L is never an equilibrium as one retailer always has an incentive to deviate by selecting H.

[15] For instance, anticipating that the pair $M_A - R_1$ reaches an agreement, the fixed fee F_{A2}^{HH} negotiated between M_A and R_2 is determined by the following maximization problem: $\max_{F_{A2}^{HH}} \left(3 - F_{A2}^{HH}\right)^{\alpha} \left(F_{A2}^{HH} + F_{A1}^{HH} - F_{A1}^{H}\right)^{1-\alpha}$, where $F_{A1}^{H} = (1-\alpha)5$ is M_A's status quo profit in the event of a bargaining breakdown with R_2.

high, retailers get a large fraction of the surplus generated by the sale of their products implying that they always select the product that generates the highest profit, H. Such a strategy is, however, no longer optimal when buyer power is low. Instead, by selecting a different product, retailers annihilate the status quo position of manufacturers in negotiations. Hence, the differentiation of suppliers becomes a source of buyer power for retailers which get a larger slice of a smaller pie.

As in Proposition 1, Proposition 3 states that a retailer can exclude an efficient product from its assortment for a buyer power motive.

2.2 Downstream exclusion

We now analyze exclusion in vertical markets with one upstream manufacturer, M, which distributes its product through two competing downstream retailers, denoted by R_j with $j = 1, 2$.

Product scarcity to thwart buyer power. The presence of buyer power may give M a strategic incentive to stimulate competition between retailers by keeping its product relatively scarce. To formalize this idea, we present here a simple example developed in Montez (2007). Retailers operate in different markets and each retailer purchases at most one unit of M's product which generates a revenue of 1 when sold to consumers.[16] M incurs a per-unit production cost of $\frac{1}{2}$. The timing of play is as follows:

1. M chooses how many units of its good to produce and incurs the associated cost.

2. Bargaining between M and retailers takes place.

The Shapley value is used to determine the division of surplus in stage 2. Consider first that M chooses to produce only one unit of its product. In this case, M's Shapley value equals $S_M(1) = \frac{1}{6}(2 \times 0 + 2 \times 1 + 2 \times 1) = \frac{2}{3}$, implying that it gets an (expected)

[16] Montez (2007) shows that the same result obtains when retailers purchase a continuous quantity of M's product and compete on the market.

profit of $\frac{2}{3} - \frac{1}{2} = \frac{1}{6}$.[17] Consider now that M chooses to produce two units of its product. In this case, M's Shapley value equals $S_M(2) = \frac{1}{6}(2 \times 0 + 2 \times 1 + 2 \times 2) = 1$, implying that it gets an (expected) profit of $1 - 2 \times \frac{1}{2} = 0$. We obtain the following proposition:

Proposition 4 *A manufacturer may have an incentive to keep its product scarce, thereby excluding a retailer, to thwart buyer power.*

The logic underlying this result is as follows. When M produces two units of its product, it needs both retailers for selling its production implying that it gets a share $\frac{1}{2}$ of the revenue generated by the sale of each unit. In contrast, when M produces only one unit, it obtains a share $\frac{2}{3}$ of the revenue generated by the sale of this unit as retailers are both equally able to sell it.

Proposition 4 closely relates to the exclusion mechanism of Proposition 1 as M's tactic to strengthen its bargaining leverage stems from control over a scarce resource. In this case, however, it is the presence of buyer power which generates incentives for exclusion.[18]

Downstream exclusive dealing. We now analyze the rationale for a retailer to use its buyer power to induce exclusion of its rival. Following Marx and Shaffer (2007), we consider a simple model in which R_1 enjoys a competitive advantage over R_2 for the sale of M's product. The total industry profit is, however, greater when both retailers distribute M's product (soft retail substitution). Table 2 provides a numerical example by depicting the (reduced-form) profit generated by each $M - R_j$ pair for all possible market configurations. We assume that retailers have all the bargaining power and interact with M as follows:

1. Retailers make simultaneous take-it-or-leave-it offers to M. Each offer stipulates a fixed fee and whether or not an exclusive dealing requirement is imposed on M.

[17] An interpretation of the Shapley value is that all players are ranked in ordered sequences which are all equally likely. Then, each player obtains its marginal contribution to the coalition formed by the player(s) who precede this player.

[18] Camera and Selcuk (2010) obtain the same result in a setting where M pre-commits on the number of units to be produced for its good before negotiating terms of trade based on a noncooperative sequential bargaining game à la Rubinstein and Wolinsky (1990).

Table 2: Joint profit generated by each retailer

R_1 \ R_2	Selling M's product	Not selling M's product
Selling M's product	(4,3)	(5,0)
Not selling M's product	(0,4)	(0,0)

2. M simultaneously accepts or rejects each offer.

The basic intuition for the solution to this game is as follows. Note first that there is no equilibrium without exclusivity. Indeed, a candidate equilibrium without exclusive dealing must be such that M is indifferent between accepting both offers or accepting only R_j's offer.[19] From Table 2, the only relevant candidate is $(\hat{F}_1, \hat{F}_2) = (0, 0)$. Each retailer, however, has an incentive to impose an exclusive dealing clause (even at $F_1 = F_2 = 0$) as it would then earn a higher profit. The only possible equilibria thus involve exclusivity. This implies that the contracting stage boils down to a Bertrand-like competition for exclusivity. From Table 2, we obtain that R_1's exclusive dealing offer is accepted, M gets $F_1^{ED} = 4$, R_1 gets $5 - F_1^{ED} = 1$ and R_2 gets 0.[20] This leads to the following proposition:

Proposition 5 *A dominant retailer with full buyer power imposes exclusive dealing on a monopolist manufacturer, thereby excluding the weaker retailer.*

The logic is as follows. When retailers make the offers, R_j cannot get more than the joint profit generated by the pair $M - R_j$. Thus, each retailer always has an incentive to offer exclusivity to increase its joint profit. Instead, if M were to make the offers it would always be able to capture the industry profit. In this case, exclusion would never arise because the industry profit is greater when both retailers are active. Hence, Proposition 5 closely relates to Proposition 2 in stating that buyer power also makes (inefficient) exclusive dealing profitable for retailers.

As highlighted by Marx and Shaffer (2007), Proposition 5 holds absent explicit exclusive dealing provisions. Indeed, the same result obtains if the exclusive dealing

[19] Otherwise, a retailer could profitably decrease its fixed fee without affecting the equilibrium network.

[20] There exist other pure-strategy Nash equilibria which, however, are not trembling-hand perfect.

Table 3: Profits generated by each retailer

	$\{AB, AB\}$	$\{AB, A\}$	$\{A, B\}$	$\{A, A\}$	$\{AB, \emptyset\}$	$\{A, \emptyset\}$
Perfect retail substitution	(0,0)	(4,0)	(7,7)	(0,0)	(16,0)	(12,0)
Soft retail substitution	(9,9)	(15,5)	(10,10)	(8,8)	(16,0)	(12,0)

Notes: The first row shows the distribution network where the first and second terms in brackets indicate respectively R_1's and R_2's assortments.

clause is replaced by an upfront fee paid by M if it accepts the offer.[21] In such a case, however, Miklós-Thal, Rey and Vergé (2011) and Rey and Whinston (2013) point out that exclusion no longer arises if retailers can make contingent offers as in Bernheim and Whinston (1998).[22]

3 Interlocking relationships

This section examines the exclusionary effect of buyer power in vertical structures where manufacturers and retailers can engage in "interlocking relationships". To this end, we consider a model of vertical relations in which two symmetrically differentiated manufacturers M_A and M_B may distribute their products on the market through two symmetrically differentiated retailers R_1 and R_2. There are thus six potential distribution networks : "Interlocking Relationships" (IR) when each retailer deals with both manufacturers, "Asymmetric Structure" (AS) when a retailer deals with both manufacturers whereas its rival deals with a single manufacturer, "Upstream Foreclosure" (UF) when a single manufacturer deals with both retailers, "Downstream Foreclosure" (DF) when a single retailer deals with both manufacturers, "Pairwise Exclusivity" (PE) when each retailer deals with a single manufacturer different from its rival, and "Bilateral Monopoly" (BM) when a single retailer deals with a single manufacturer.

Table 3 displays the profit generated by each retailer in all possible market config-

[21] In contrast, the fixed fee is paid by the retailer to M only if it distributes M's product.

[22] Absent upfront fees, Miklós-Thal, Rey and Vergé (2011) further show that contingent offers do not suffice to prevent exclusion when retailers are close substitutes. Gabrielsen and Johansen (2015) extend this setting to upstream competition by including a competitive fringe. While exclusionary equilibria still arise under buyer power, they find that exclusive contracting is more frequently used when M dictates the terms of trade.

urations for different levels of retail substitution.[23] Under perfect retail substitution, a retailer begets zero profit when its rival offers the same product(s). In that case, if retailers have all the bargaining power vis-à-vis manufacturers, it is straightforward that there exist three equilibrium distribution networks: IR, PE, and DF. Under soft retail substitution, each retailer begets positive profits in all market configurations. Moreover, these profits are higher when the product assortments of retailers differ. If retailers have all the bargaining power vis-à-vis manufacturers, it is then straightforward that IR is the unique equilibrium distribution network.

Interactions between manufacturers and retailers are determined by the following two-stage game:

1. The manufacturer-retailer distribution network is publicly determined.
2. Bilateral negotiations over fixed fees take place. If multiple manufacturer-retailer pairs engage in trading relationships, negotiations are simultaneous and secret.

We use the NiN bargaining solution as a surplus division rule in stage 2. Firms' payoffs from bilateral negotiations in each potential market configuration are given in Table 4.[24] Based on this payoff matrix, we consider two different modeling assumptions for the determination of the distribution network in stage 1 and discuss their implications for the role of buyer power on exclusion.

Simultaneous veto game. We first consider that the distribution network is determined through a simultaneous veto game as in Rey and Vergé (2020).[25] More specifically, each manufacturer (resp. retailer) announces with which retailer (resp.

[23] As mentioned in the previous section, we abstract away from specifying a model of competition by summarizing retail rivalry on the downstream market using reduced-form profits. We focus on the case of perfect retail substitution for the sake of exposition but it is worth mentioning that the same results would arise if retailers were close (but not perfect) substitutes. While manufacturers are imperfect substitutes, we do not vary the degree of substitution between them for the sake of conciseness. As shown by the articles reviewed in this section, the substitution between manufacturers only plays a limited role on the equilibrium distribution network.

[24] These payoffs are derived using the profits generated by each retailer in Table 3. Under perfect retail substitution, it is worth noting that a distribution network with AS (structure $\{AB, A\}$) is unstable as the pair $M_A - R_1$ always fails to reach an agreement. This is due to intrabrand competition which annihilates firms' gains from trade. In this case, a distribution network with AS becomes PE (structure $\{A, B\}$).

[25] This is also referred to as a simultaneous link-announcement game (Jackson, 2008, Chapter 11).

Table 4: Payoffs of firms from bilateral negotiations

	$\{AB, AB\}$	$\{AB, A\}$	$\{A, B\}$	$\{A, A\}$	$\{AB, \emptyset\}$	$\{A, \emptyset\}$
Perfect retail substitution						
M_A	0	–	$(1-\alpha)7$	0	$(1-\alpha)4$	$(1-\alpha)12$
M_B	0	–	$(1-\alpha)7$	0	$(1-\alpha)4$	0
R_1	0	–	$\alpha 7$	0	$\alpha 8 + 8$	$\alpha 12$
R_2	0	–	$\alpha 7$	0	0	0
Soft retail substitution						
M_A	$(1-\alpha)8$	$(1-\alpha)10$	$(1-\alpha)10$	$(1-\alpha)16$	$(1-\alpha)4$	$(1-\alpha)12$
M_B	$(1-\alpha)8$	$(1-\alpha)7$	$(1-\alpha)10$	0	$(1-\alpha)4$	0
R_1	$\alpha 8 + 1$	$\alpha 12 + 3$	$\alpha 10$	$\alpha 8$	$\alpha 8 + 8$	$\alpha 12$
R_2	$\alpha 8 + 1$	$\alpha 5$	$\alpha 10$	$\alpha 8$	0	0

Notes: The first row shows the distribution network where the first and second terms in brackets indicate respectively R_1's and R_2's assortments.

manufacturer) it wishes to form a trading relationship. These announcements are simultaneous and the formation of a relationship requires the consent of both parties. We follow Rey and Vergé (2020) by focusing on Coalition Proof Nash (CPN) equilibria (Bernheim, Peleg and Whinston, 1987).[26]

When retail substitution is perfect (upper part of Table 4), intrabrand competition on the downstream market dissipates profits. Hence, manufacturers have incentives to soften downstream competition by trading with a single retailer, which implies that PE is the unique CPN equilibrium.[27] As Rey and Vergé (2020) show, this result applies whenever retail substitution is strong (and not only perfect). Instead, when retail substitution is soft (lower part of Table 4), it is weakly profitable for a manufacturer (resp. retailer) to form a new relationship with a retailer (resp. manufacturer) in any market configuration. In this case, IR is the unique CPN equilibrium. We obtain the following proposition:

[26] As discussed in Chapter 11 of Jackson (2008), the concept of Nash equilibrium admits unreasonable outcomes (e.g., the empty distribution network in which no trading relationship is formed is a Nash equilibrium). The coalition-proof refinement overcomes this shortcoming by restricting attention to Nash equilibria that are immune to (self-enforcing) deviations by any conceivable coalitions of firms.

[27] Instead of PE, Rey and Vergé (2020) show that DF can arise in equilibrium as it also allows firms to eliminate intrabrand competition. However, this never occurs under a linear demand system (see Rey and Vergé, 2020) as well as in our example because the marginal contribution of a manufacturer in the profit generated by a retailer is higher under PE than under DF.

Proposition 6 *When the distribution network is determined through a simultaneous veto game, buyer power plays no role on the equilibrium market structure. There exists a unique equilibrium with interlocking relationships when retail substitution is soft and a unique equilibrium with pairwise exclusivity when retail substitution is perfect.*

Surprisingly, Proposition 6 states that firms' relative bargaining power does not play any role in the equilibrium distribution network. As Rey and Vergé (2020) explain, under soft retail substitution, trading with an additional partner is always beneficial to any manufacturer and any retailer regardless of α. Instead, under perfect retail substitution, as intrabrand competition dissipates profits each firm has an incentive to deal with only one trading partner regardless of α. Interestingly, Nocke and Rey (2018) obtain a similar result in a related bilateral duopoly setting where the distribution network is determined through a sequential adoption game of exclusive dealing provisions. Focusing on a case of fierce retail competition, they indeed show that all subgame perfect equilibria yield PE regardless of the degree of buyer power.[28]

While Proposition 6 sheds important light on the role of retail substitution in shaping distribution networks, its result on buyer power stands in stark contrast with previous propositions. Incorporating dynamics into the model may, however, reverse this conclusion. For instance, Lee and Fong (2013) consider an infinite horizon game in which, for a given period, the distribution network and the division of surplus are determined like in Rey and Vergé (2020). Assuming that the costs of forming a relationship depend on the set of previous agreements, the model's dynamic implies that bargaining outcomes for a given period affect and are affected by distribution networks and bilateral negotiations in future periods. Hence, as Lee and Fong (2013) show, buyer power has a significant impact on the equilibrium distribution network.[29]

[28] Ramezzana (2020) also finds that strong substitution between retailers may give rise to PE when the distribution network is determined through a veto game with transfers as in Bloch and Jackson (2007). Similarly, de Fontenay and Gans (2014) find that retail substitution may narrow the equilibrium distribution network when contracts are contingent upon the set of manufacturer-retailer agreements. It is noteworthy that an earlier derivation of this result can be found in Dobson and Waterson (1996) who consider a bilateral duopoly framework absent buyer power.

[29] In a different framework, Stole and Zwiebel (1996) also obtain that the distribution network is a function of buyer power. In contrast to Lee and Fong (2013), however, their bargaining protocol which allows for immediate renegotiations upon disagreements rules out the possibility to form new trading relationships.

Motivated by recent empirical evidence suggesting that retailers may strategically restrict the set of their trading partners to increase their bargaining leverage (see, e.g., Ellison and Snyder, 2010; Ho and Lee, 2019; Starc and Swanson, 2021; Hristakeva, 2022*a*), we examine an alternative approach that abstracts from dynamic considerations but provides sharp predictions about the role of buyer power on exclusion in interlocking relationships.

Product selection with competition for slots. We follow an ongoing research project, Chambolle, Christin and Molina (2022), by considering that the distribution network is determined through a product selection process in which each retailer may auction off a limited number of slots before choosing its product assortment. This reflects well the conduct of firms in industries in which manufacturers provide retailers with upfront payments for the carriage of their products.[30] More precisely, the timing of play in stage 1 is as follows:

1.a Each retailer may publicly announce its decision to restrict its number of available slots. If R_j does so, manufacturers simultaneously and secretly offer slotting fees (non-negative lump sum payments) to secure R_j's unique slot.

1.b Retailers simultaneously and publicly make their product assortment decision. If a retailer accepts a slotting fee, it must select the manufacturer's product.

As retailers choose their product assortment, it is worth noting that this modeling approach rules out the possibility that DF and BM arise in equilibrium. Using Table 4, we solve the game by backward induction.

When retail substitution is soft, there are three cases to consider. Assume first that both retailers restrict access to their slots. Absent slotting fees, it is straightforward from Table 4 (lower part) that each retailer has an incentive to trade with a manufacturer different from its rival. As each manufacturer is better off trading with both retailers, manufacturers compete against each other by offering slotting

[30]This is for instance the case in the grocery retail sector where anecdotal evidence gathered by the Federal Trade Commission (2001) point out that slotting fees: "may serve as devices for retailers to auction their shelf space and efficiently determine its highest-valued use.". See also Elberg and Noton (2021) and Hristakeva (2022*b*) for recent empirical evidence on the use of upfront payments in the supermarket industry.

Table 5: Profits of firms under competition for slots
(soft retail substitution)

	$\{AB, A\}$	$\{A, B\}$
M_A	$(1-\alpha)10$	$\min\{(1-\alpha)10, -2\alpha+4\}$
M_B	$(1-\alpha)7$	$\min\{(1-\alpha)10, -2\alpha+4\}$
R_1	$\alpha 12+3$	$\max\{\alpha 10, \alpha 2+6\}$
R_2	$\alpha 2+3$	$\max\{\alpha 10, \alpha 2+6\}$

Notes: The first row shows the distribution network where the first and second terms in brackets indicate respectively R_1's and R_2's trading relationships.

fees to R_1 and R_2.[31] Consider the competition for R_1's slot, anticipating that M_B wins the competition for R_2's slot. In this case, M_B offers a slotting fee equal to its incremental gain from trading with both retailers rather than only one, that is $(1-\alpha)16-(1-\alpha)10 = (1-\alpha)6$. However, M_A wins the competition for R_1's slot by offering a slotting fee S such that R_1 is indifferent between trading with either M_A or M_B, that is $\alpha 10 + S = \alpha 8 + (1-\alpha)6 \Rightarrow S = \max\{6-\alpha 8, 0\}$.[32] Hence, by symmetry, there is a unique equilibrium distribution network with PE in which each retailer gets $\alpha 10 + S = \max\{\alpha 10, \alpha 2 + 6\}$ and each manufacturer gets $(1-\alpha)10 - S = \min\{(1-\alpha)10, -2\alpha+4\}$.

Assume now that only R_2 restricts access to its slots. In this case, it is straightforward from Table 4 (lower part) that R_1 always chooses to trade with both manufacturers. Manufacturers thus compete against each other by offering slotting fees to R_2, anticipating their trading relationship with R_1. In this competition for R_2's slot, each manufacturer offers a slotting fee equal to its incremental gain from trading with both retailers rather than only one, that is $(1-\alpha)10-(1-\alpha)7 = (1-\alpha)3$. Hence, R_2 is indifferent between both offers and chooses to trade with M_A say. There is thus a unique equilibrium distribution network with AS in which R_2 gets $\alpha 5 + (1-\alpha)3 = \alpha 2 + 3$, M_A gets $(1-\alpha)10 - (1-\alpha)3 = (1-\alpha)7$, and the profits of M_B and R_1 are given in Table 4 (lower part, structure $\{AB, A\}$).

[31] We keep here the same information structure as in the NiN bargaining by assuming that each manufacturer sends two delegated agents which simultaneously make an offer to each retailer.

[32] As shown in Chambolle, Christin and Molina (2022), this is the unique trembling-hand perfect Nash equilibrium.

Finally, assume that no retailer restricts access to its slots. As each retailer has an incentive to trade with both manufacturers, there is a unique equilibrium distribution network with IR and firms' profits are given in Table 4 (lower part, structure $\{AB, AB\}$).

Proposition 7 *When the distribution network is determined through retailers' selection with a competition for slots and retail substitution is soft, buyer power plays a critical role on the equilibrium market structure:*

- *there exists a unique equilibrium with pairwise exclusivity if* $\frac{3}{10} > \alpha$*,*
- *there exists a unique equilibrium with asymmetric structure if* $\frac{1}{3} > \alpha > \frac{3}{10}$*,*
- *there exists a unique equilibrium with interlocking relationships otherwise.*

The intuition is as follows. Under soft retail substitution, it is straightforward that IR arises when buyer power is high ($\alpha > \frac{1}{3}$). When buyer power decreases ($\frac{1}{3} > \alpha$), however, retailers get lower profits from their bilateral negotiations with manufacturers which, in turn, generates incentives to restrict access to their slots. Indeed, in a spirit similar to the exclusion mechanism in Proposition 1, the competition for slots allows retailers to play manufacturers off against each other and extract additional rents via the slotting fees. Interestingly, when $\frac{1}{3} > \alpha > \frac{3}{10}$, only one retailer restricts access to its slots. On the one hand, the slotting fee received by retailers under PE is decreasing in α which gives an incentive for (at least) one retailer to trade with both manufacturers. On the other hand, the benefit that the other retailer would then get from trading with both manufacturers is lower when its rival trades with both manufacturers. Hence, the prospect of getting a slotting fee explains why one retailer keeps restricting access to its slots as long as $\frac{1}{3} > \alpha$. By showing that buyer power plays a critical role on the equilibrium distribution network when retailers are not close substitutes, Proposition 7 thus directly extends the exclusion mechanism of Proposition 1 to vertically related markets with downstream competition.[33]

[33] In the polar case where retailers are independent, Chambolle, Christin and Molina (2022) further show that Proposition 7 replicates Proposition 1 when manufacturers are symmetric. This result directly relates to Chambolle and Molina (forthcoming) who introduce the "Nash-in-Nash with Prior Competition for Slots" model to provide a microfoundation for the NNTR solution.

Under perfect retail substitution, intrabrand competition eliminates any incentive for retailers to trade with the same manufacturer. Similarly, no manufacturer has any incentive to trade with both retailers. When no retailer restricts its slots, there are two equilibrium distribution networks, either PE or IR. As retailers obtain a positive profit under PE, however, they both have an incentive to restrict their slots. This implies that there exists a unique equilibrium distribution network with PE in which firms' profits are given in Table 4 (upper part). We obtain the following proposition:

Proposition 8 *When the distribution network is determined through retailers' selection with a competition for slots and retail substitution is perfect, there exists a unique pairwise exclusivity equilibrium.*

In the case of perfect retail substitution, the incremental value that a retailer's slot generates for manufacturers compared to its rival is nil. Therefore, manufacturers never compete for a retailer's slot. As already highlighted in Rey and Vergé (2020), buyer power plays no role on the equilibrium market structure in this case. As a result, Proposition 8 preserves the main logic of Proposition 6 according to which retail substitution leads to exclusion.

4 Conclusion

Through illustrative examples, this article reviews recent theories of the role of buyer power on anticompetitive exclusion in vertically related markets. The analysis of simple vertical structures suggests that the distribution of bargaining power in the vertical chain has a significant impact on upstream and downstream exclusion. While buyer power reduces the incentive for a retailer to restrict is slots, it increases the profitability of exclusivity clauses. As emphasized by Miklós-Thal, Rey and Vergé (2010), interlocking relationships raise numerous modeling issues and the analysis of buyer power in this context remains an important research agenda. Ongoing work on this topic suggests that the interplay between buyer power and retail substitution is a key determinant of the formation of distribution networks. In particular, the lack of buyer power provides retailers with incentives to exclude manufacturers when retail substitution is soft.

From a competition policy perspective, these findings support the view that buyer power does not simply affect the allocation of surplus between manufacturers and retailers but may also distort product variety and increase retail prices to the detriment of consumers. By contrast with most alternative theories of profitable exclusion, the mechanisms through which anticompetitive exclusion arises neither require scale economies nor inefficient contracting. This provides guidance for the antitrust treatment of buyer power which has become a major issue these last decades.

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