New Product Introduction and Slotting Fees *

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Abstract

The availability of a new product in a store creates, through word-of-mouth advertising, an informative spillover that may go beyond the store itself. We show that, because of this spillover, each retailer is able to extract a slotting fee from the manufacturer, at product introduction. Slotting fees may discourage innovation by an incumbent or an entrant and in turn harm consumer surplus and welfare. We further show that a manufacturer is likely to pay lower slotting fees when it can heavily advertize or when it faces larger buyers. Finally, we prove that our results hold when introducing retail competition, when firms are forward looking and when the innovator is a potential entrant rather than an incumbent.

KeyWords: Buyer Power, Innovation, Slotting Fees, Informative Advertising.

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1 Introduction

Slotting fees are upfront payments from the manufacturer to the retailer, paid to secure a slot for a new product in retailers' shelves. Their amount and frequency have rapidly grown since the mid-1980s. Outside of case studies conducted by the FTC (2003), there is practically no data available on slotting fees.[1] The FTC interviewed seven retailers, six manufacturers and two food brokers on five categories of products.[2] According to the surveyed suppliers 80% to 90% of their new product introductions in the relevant categories triggered the payment of such fees in 2000. In their opinion, 50% to 90% of all new grocery products would trigger the payment of slotting allowances. The FTC (2003) further mentions that: "[...] slotting allowances for introducing a new product nationwide could range from a little under [$]1 million to over 2 million, depending on the product category."

Despite this thorough investigation, the FTC still refrains from issuing slotting allowance guidelines. In contrast, several paragraphs of the European Guidelines on vertical restraints in 2010 are devoted to upfront access payments which comprise slotting allowances, and recommend a case by case analysis if the retailer or the manufacturer concerned has a market share larger than 30%.[3] The attitude of competition authorities reflects the conflicting views on the effect of slotting fees expressed by both the economic literature and practitioneers. Indeed, slotting fees may have anti-competitive as well as efficiency enhancing effects.

Retailers often justify slotting allowances as a risk-sharing mechanism and a means to screen the most profitable innovations. They also argue that slotting allowances are a natural way to compensate the higher retailing costs that result from new product introduction. In contrast, manufacturers often see slotting allowances as rent extracted by increasingly powerful retailers that may foreclose efficient products. However, buyer power in itself is not enough to explain why retailers would be able to capture an extra rent for new product introduction. Finally, as explained by the European Commission (2010) "upfront access payments may soften competition and facilitate collusion between distributors."

[1]A recent paper by Hristakeva (2016) attempts to assess the amount of slotting allowances in the US. However, the definition of slotting allowances in this paper is broader than the FTC's definition, as it comprises all lump-sum transfers to retailers.

[2]These categories were fresh bread, hot-dogs, ice-cream and frozen novelties, pasta, and salad dressing.

[3]See the European Commission's "Guidelines on Vertical Restraints" (2010), p.59, paragraphs 203-208.

Our paper provides a new rationale for the use of slotting fees. Our starting point is that the demand for a new product depends first and foremost on consumers' knowledge of its existence.[4] Among other sources of information about the new product, consumers are informed through word-of-mouth communication with consumers who already bought the new product. Several studies ackowledge the importance of word-of-mouth communication in the purchase of a new product.[5] According to a worldwide study by Nielsen, in 2012 the two main channels that push a consumer to purchase a new product are friends and family (77%) and seeing it in the store (72%).[6] Therefore, the presence of a new product in a given store creates a form of informative spillover that may go beyond the store itself and reach consumers across markets. In other words, by making available the new product in a given market, a retailer offers, as a by-product, an informative advertising service to the manufacturer. This paper shows that the retailer is able to extract a slotting fee from the manufacturer for this service. Although this slotting fee is only paid once, that is at introduction, it may deter the manufacturer's incentive to launch a new product.

We analyze the relationship between an upstream monopolist and several retailers each active on a separate market. The manufacturer can always sell a well-known good to all retailers. It may also offer, provided it pays a fixed cost of innovation, a new good of better quality. We adopt a two-period game. In the first period, the manufacturer chooses to innovate or not in a first stage and then bargains in a second stage with each retailer to sell its product. In the second period, the manufacturer bargains with each retailer to sell the well-known good – absent innovation – or the new good – in case of innovation. In each period, we consider bargaining among each pair following the specification of Stole and Zwiebel (1996).[7] On the demand side, we introduce an "informative spillover": when the manufacturer launches a new product, selling through one outlet increases demand in all other outlets in which the product is sold in the first period. If the new product was launched in the first period in all markets, then in the second period, the product is mature and the informative spillover no longer plays a role. This informative spillover builds on

[4]The marketing literature on the hierarchy of effects in advertising identifies three successive steps: cognitive, affective and conative. The cognitive step both includes awareness and knowledge about a new product (see Barry and Howard, 1990.)

[5]According to McKinsey (2010), "word-of-mouth is the primary factor behind 20 to 50 % of all purchasing decisions. Its influence is greatest when consumers are buying a product for the first time". According to Jack Morton (2012), 49% of U.S. consumers say friends and family are their top sources of brand awareness.

[6]The same study highlights that 59% of consumers like to tell others about new products.

[7]As shown by Stole and Zwiebel (1996), this solution concept gives rise to the Shapley value.

the literature on informative advertising following the seminal paper by Grossman and Shapiro (1984) as only consumers informed about the new product existence may have a positive demand for the good. Moreover, it also directly relates to a large literature which, following Telser (1960), hinges on the public good nature of retail services.[8]

We show that when the manufacturer launches a new product, it successfully bargains with all retailers in both periods. Moreover, the retailer is able to extract a slotting fee from the manufacturer in the introduction period. Indeed, when bargaining over a new product, the manufacturer must compensate each retailer for the positive informative spillover it generates on all other markets. The presence of a spillover in the first period is thus a new source of buyer power; in the second period, as the new product is mature, retailers no longer benefit from the informative spillover. As a result, informative spillover may deter innovation as it decreases the manufacturer's profit when launching a new product. We show that innovation deterrence is harmful for both consumer surplus and welfare. We then highlight that an informative advertising campaign at introduction is likely to lower the amount of slotting fees paid to retailers. Therefore, slotting fees are less likely to deter innovation when the manufacturer is able to heavily advertise its new product at low cost.

Further, we show that, surprisingly, retail concentration may reduce the magnitude of slotting fees per outlet. This result contrasts with the standard result that buyer power comes from buyer size. We thus exhibit a positive impact of retail concentration on the manufacturer's innovation incentives.

We then develop a variant of our base model in which slotting fees are explicit, i.e. negative upfront fees, which enables us to derive some implications of our results in terms of competition policy. Our results call for a ban on slotting fees to limit innovation deterrence.

Finally, we show that our main results are unchanged when introducing retail competition within markets and when the new product is introduced by a potential entrant rather than an incumbent. In addition, although in our main model, firms are myopic with respect to their decision to innovate and in the bargaining process, we explore the more complex case in which firms are forward-looking. We highlight that the amount of slotting fees is likely to be larger in that context.

Our work is first related to the industrial organization and marketing literature on slotting fees.

[8]See Motta (2004) for a survey of this literature. In contrast with this literature, in our paper, the informative spillover is not strategic; it is costless and only a by-product of the decision to sell the good.

A first strand of the literature relates the existence of slotting fees to retail buyer power and highlights diverse potential anticompetitive effects. Shaffer (1991) shows that when differentiated retailers buy from perfectly competitive manufacturers, they obtain a contract with slotting fees (*i.e.* negative franchise fees) in exchange for high wholesale prices that enable to relax retail competition.[9] Shaffer (2005) considers a framework in which imperfectly competitive retailers can either buy from a dominant firm or a competitive fringe. Because of slotting fees, the dominant firm may obtain scarce shelf space and foreclose more efficient rivals, for it is willing to pay a higher price to protect its rent.

These articles, however, do not take into account the peculiarities of new products in their analysis. Recent papers have taken into account one of these peculiarities by enriching the usual two-part tariff contracts. Marx and Shaffer (2007) explicitely differentiate slotting fees, defined as lump-sum payments not conditioned by an effective sale, from franchise fees, paid only if the product is effectively sold. By allowing for such three-part tariffs, they typically take into account shelf access fees, which are a common feature of all first listings of products at a retailer. Marx and Shaffer (2007) highlight that slotting fees may facilitate retail foreclosure: a powerful retailer can use slotting fees to exclude its weaker rival. However, Miklos-Thal *et al.* (2011) and Rey and Whinston (2013) show that this result may be reversed allowing for contracts that are contingent on the relationship being exclusive or not, or for a menu of tariffs. Marx and Shaffer (2010) highlight that capturing the rent of manufacturers through slotting fees may also push retailers to restrict their shelf space. Slotting fees then reduce the variety of products offered to consumers.

A second strand of literature, which rather emphasizes efficiency effects of slotting fees, more explicitely relates slotting fees to the additionnal costs associated to new product introduction. As shown by Chu (1992) or Larivière and Padmanabhan (1997), slotting fees can be an efficient way for privately informed manufacturers to convey information about the likelihood of success of their new product. The retailer simply uses slotting fees as a screening device. Kelly (1991) argues that slotting fees may be used to share the risk of launching a new product between manufacturer and retailer. Sullivan (1997) and Larivière and Padmanabhan (1997) show that slotting fees may be used to compensate the retailer for extra retail costs inherent to the launching of a new product. Foros *et al.* (2009) show that, when the retailer is powerful, slotting fees make up for a high

[9] See also Foros and Kind (2008) for an extension of Shaffer (1991) taking into account procurement alliances.

wholesale price that raises incentives for the manufacturer to promote its new product through demand-enhancing investments. Slotting fees therefore enable a better coordination of investment decision within the vertical chain.

To the best of our knowledge, Yehezkel (2014) is the only article that both takes into account informative peculiarities of new product and exhibits a harmful welfare effect of slotting fees. In contrast with Yehezkel (2014), we consider that information about the quality of the new product is perfect within the vertical chain and that consumers are imperfectly informed about the existence of this new product.

Finally, previous work in the industrial organization literature has studied the positive impact of buyer size on buyer power on the one hand (see *e.g.* Chipty and Snyder, 1999; Inderst and Wey, 2003, 2007; Montez, 2007; Smith and Thanassoulis, 2012), and the negative impact of buyer power on upstream innovation incentives on the other hand (see *e.g.* Batigalli *et al.*, 2007; Chen, 2014; Chambolle *et al.*, 2015). In contrast, in our framework, we show that buyer size may lower the magnitude of slotting fees paid at new product introduction and thus facilitate upstream innovation.

The paper is organized as follows. Section 2 derives the model. Section 3 shows that, due to the informative spillover, slotting allowances are paid for a new product, at introduction, and highlights their consequences on innovation, consumer surplus and welfare. We then explore the effect of retail concentration on slotting fees in Section 4. In Section 5 we discuss some implications in terms of competition policy. Section 6 shows that our main results are robust when considering retail competition, forward looking firms and potential entry by an innovator. Section 7 concludes.

2 The Model

An upstream firm U may offer a good to final consumers through $i \in \{1, \cdots, N\}$ symmetric retailers located on N independent markets. U can always offer a well-known good of quality q^- to all retailers. It may also offer a new (unknown) good of better quality $q^+ > q^-$. Due to a capacity constraint on its shelf space, a retailer can only sell one of these two goods. Production and retailing costs are normalized to 0.

First in subsection 2.1, we present a reduced form model by giving our assumptions on the market revenues for a well-known as well as a new good. Then, in subsection 2.2 we wholly describe the microfoundations of these market revenues. This second part requires the introduction of numerous notations that will not be used again and can therefore be read separately from the rest of the paper. Finally, in subsection 2.3, we describe our game and the bargaining setting.

2.1 Reduced-form model

The presence of an informative spillover results in a difference in the revenue generated in a given market through the sale of a new and a well-known good. We consider a two-period game in which periods are indexed by $t \in \{1,2\}$. We describe these market revenues[10] in turn for each period.

Revenue in $t = 1$. We denote by υ^n the revenue earned in each outlet $i \in \{1,...,n\}$ when U sells a new product of quality q^+ through n markets in $t = 1$. The revenue υ^n is naturally increasing with respect to q^+. We make the following assumption:

Assumption 1. *If U sells a new good through $n \in \{1,...,N\}$ outlets in $t = 1$, the revenue earned in each outlet is υ^n. For all $n \in \{1,...,N\}$, $\upsilon^n \geq \upsilon^{n-1}$, and $\upsilon^0 = 0$.*

The assumption $\upsilon^0 = 0$ means that the product generates no revenue when it is not sold. Assumption 1 reflects the presence of an informative spillover: an increase in the number of outlets n that actually sell the new good in $t = 1$ (introduction) increases the revenue that the new good is able to generate on each active market. Indeed, as more markets sell the new good, there are more informative channels for a given consumer to discover its existence and, although markets are independent, information can circulate from one market to the other thereby increasing demand on all markets.[11]

The total industry revenue for a new product sold in n outlets at introduction is defined as follows:

$$R^n \equiv n\upsilon^n. \tag{1}$$

Note that υ^N is the largest revenue that can be generated in a given market, that is the revenue when all consumers are perfectly informed of the existence of the good. Therefore R^N is the largest industry revenue.

[10] A market revenue is here equivalent to a market profit as all production and retailing costs are normalized to 0.

[11] Friends and family do not need to visit the same store to talk with each other about a new product.

If a well-known good of quality q^- is sold on a given market $i \in \{1,...,n\}$ in $t = 1$, consumers on all N markets are already aware of its existence: the informative spillover has no role to play. We thus make the following assumption:

Assumption 2. *The revenue earned in outlet $i \in \{1,\cdots,n\}$ when U sells a well-known good through any number $n \in \{1,...,N\}$ of markets is $\upsilon^- < \upsilon^N$.*

The total industry revenue for a well-known good sold in n outlets is thus $n\upsilon^-$.

Revenue in period $t = 2$ If the new product was not launched in $t = 1$, then in $t = 2$ the old product is sold, and the revenue generated by the new product is as defined in Assumption 2. If the new product was launched in $t = 1$, then we make the following assumption:

Assumption 3. *If U launched a new good in $t = 1$ on n markets, the revenue earned in each outlet when U sells the new good through any number $n' \in \{1,...,N\}$ of markets in $t = 2$ is* $\max\{\upsilon^n, \upsilon^{n'}\}$.

If the new good was sold only on $n < N$ markets in $t = 1$, then information is capitalized but the informative spillover can still increase the revenue whenever $n' > n$. If U has launched the new product on all N markets in $t = 1$, then the new good becomes mature and the revenue generated on each market is υ^N for any $n' \in \{1,...,N\}$ markets. As we show below, if a new good is launched in equilibrium, it is always sold on N retail markets in $t = 1$, which clearly differentiates $t = 1$ as the introduction period from $t = 2$ the maturity period.

2.2 Microfoundations

We now describe how Assumptions 1, 2 and 3 can naturally derive from reasonable assumptions on utility and information of consumers regarding the existence of the new product.

Assume that on each market i, there is a mass of potential consumers, which we normalize to 1. A representative consumer earns utility $u(q,x)$ from consuming a quantity x of a good of quality q. We make standard assumptions on the utility function, that is $u(q,x) \geq 0$, $\frac{\partial u}{\partial x} > 0$, $\frac{\partial^2 u}{\partial x^2} < 0$ and $\frac{\partial u}{\partial q} > 0$.

All consumers are aware of the existence of the well-known good, while some consumers may be uninformed about the new product existence. When a consumer is aware of the existence of a product, it maximizes $u(q,x_i) - p_i x_i$, which generates an individual demand $x_i(q,p_i)$, with p_i the price of the good on market i. A consumer who is not aware of the new good existence has no demand for this good.

Demand in $t = 1$. If the new good is launched in $t = 1$, a consumer has a probability $\xi(n)$ of being aware of its existence on each $i \in \{1,...n\}$ markets, with $n \in \{1,...,N\}$ the number of markets in which the good is actually sold.[12] This model is in the spirit of Grossmann and Shapiro (1984)'s seminal paper on informative advertising. In their paper the probability ξ is controlled by the manufacturer through advertising investments. In contrast, in our model, our probability is only a function of the number of open markets on which the new product is sold, n, in order to reflect the word-of-mouth communication process. It also reflects the impossibility for a retailer to appropriate the informative retail service it provides to consumers. We make two key assumptions on $\xi(n)$.

Assumption 1'. *The probability that a consumer is aware of the existence of the new good when n retailers sell it, $\xi(n)$, is non-decreasing with respect to n, with $\xi(0) \in [0,1)$ and $\xi(N) = 1$.*

When the new good is sold by n retailers, the demand on market i is $X_i(q^+,n,p_i) = \xi(n)x_i(q^+,p_i)$. Assumption 1' induces that $X_i(q^+,n,p_i)$ is non-decreasing with respect to n.

Remark 1. *$\xi(n)$ is not affected by the quantity of the new good sold on the n open markets.*

Although a correlation between the quantity sold and the strength of the informative spillover would make sense, it creates additional interactions between markets which we want to rule out in our analysis.[13] Remark 1 induces that $X_i(q^+,n,p_i)$ is independent of prices on other markets.

Assuming that the revenue on a given market i when n markets are open has a unique maximum, we have:

$$\upsilon^n \equiv \max_{p_i} X_i(q^+,n,p_i)p_i. \tag{2}$$

[12] This is one among several possible micro-foundations for our demand function. Another story could be that $\xi(n)$ represents a level of trust of consumers regarding the quality of the new product. As more retailers offer the product, consumers are more inclined to purchase it. Note that in this case, the utility function could instead be written in the following way: $u(\xi(n)q,x_i) - p_i x_i$.

[13] Note also that it would only be relevant to take into account such a correlation if the retailers sold different quantities. In our framework, as the same quantity is sold *ex post* on all markets, the effect of quantity (if it exists) is entirely captured through the number of retailers.

Appendix A shows that Assumption 1' then implies Assumption 1.

Similarly, Assumption 2 derives from the following assumption:

Assumption 2'. *Regardless of the number of open markets, all consumers are aware of the existence of a well-known good.*

The demand for a well-known good on market i is thus $X_i(q^-, N, p_i) = x_i(q^-, p_i)$ even if the good is not sold on all markets. Therefore, we have:

$$\upsilon^- \equiv \max_{p_i} x_i(q^-, p_i) p_i. \tag{3}$$

Demand in $t = 2$. Finally, Assumption 3 derives from the following assumption:

Assumption 3'. *If U sells the new good on n markets in $t = 1$ and on n' markets in $t = 2$, the probability for a consumer to be aware of the existence of the new good in $t = 2$ is* $\max(\xi(n), \xi(n'))$.

If a new good was sold only on n markets in $t = 1$, then the spillover is capitalized and the demand cannot be lower than $X_i(q^+, n, p_i)$. However, the spillover can still increase the demand in $t = 2$ when U sells the new good on $n' > n$ markets. The demand becomes $X_i(q, n', p_i)$ in $t = 2$. The optimal revenue earned in outlet $i \in \{1, \cdots, n'\}$ in that case is $\max\{\upsilon^n, \upsilon^{n'}\}$.

2.3 Timing of the game and bargaining framework

In $t = 1$, we consider the following two-stage game:

- Stage 1: the manufacturer chooses whether or not to innovate. If it innovates it pays K once and for all, and can then produce the well-known good of quality q^- and the new good of quality $q^+ > q^-$, with no additionnal cost. If it does not innovate, it can only produce the well-known good of quality q^-.
- Stage 2: the manufacturer bargains sequentially with each retailer i over a fixed fee T_{it} to share the market revenue from the selling of the new (in case of innovation) or the well-known good (otherwise).[14]

[14]To reflect actual practices, we assume that long term negotiations over the two periods are not feasible.

Both qualities q^- and q^+ are common knowledge. In period $t = 2$, we merely repeat Stage 2.[15]

In Stage 2, we consider a sequential bargaining protocol *à la* Stole and Zwiebel (1996).[16] In the sequence of negotiations, the success or failure of any negotiation is common knowledge. Therefore, each retailer knows how many negotiations have succeeded when bargaining with the manufacturer U. Besides, in case of failure of the negotiation between one retailer and U, the failing pair can never negotiate again, and all other pairs renegotiate their contracts from scratch. Inderst and Wey (2003) have shown that this bargaining framework is equivalent to simultaneous bargaining in which the parties sign contracts which are contingent o, the equilibrium market structure, that is, here, to the number of active links in equilibrium. In our context, in which the success of a new product crucially depends on the number of retailers who accept to "launch" it, it is particularly relevant to adopt such a contingent contracting framework. Our bargaining protocol reflects that a retailer may take into account the number of other retailers who have accepted to launch the new product as an important determinant of its own contract.

Each negotiation depends on the firms' respective bargaining weights and outside options. Without loss of generality we set the bargaining weights to $(\frac{1}{2}, \frac{1}{2})$.[17] If the revenue to share on market i is υ^n, and the disagreement payoff of i (resp. U) is d_i (resp. d_U), when U bargains with i among n, the optimal fixed fee, T_{it} is given by:[18]

$$\upsilon^n - T_{it} - d_i = T_{it} + \sum_{j=1, j\neq i}^{n} T_{jt} - d_U. \tag{4}$$

[15]Note that this is not a restriction. We could have alternatively repeated the same two-stage game in the two periods. However, because only one innovation can take place, if profitable, innovation always occurs in $t = 1$.

[16]Stole and Zwiebel (1996) develop their analysis in the context of a firm bargaining over wages. Several papers, among which Montez (2007), Bedre-Defolie (2012), De Fontenay and Gans (2014) and Chambolle and Villas-Boas (2015), have later used this bargaining framework to analyze bargaining among vertically related firms.

[17]Note that with $(\frac{1}{2}, \frac{1}{2})$, the outcome of our negotiation coincides with the Shapley value.

[18]Negotiating over a fixed tariff is here equivalent to negotiating over a standard two-part tariff. Indeed, assume that firms bargain over a contract (w_{it}, T_{it}), with w_{it} the unit wholesale price. In each period, each pair $U - i$ uses w_{it} to maximize their joint profit and T_{it} to share it. The optimal wholesale price for each pair is set to the marginal cost, that is, $w_{it} = 0$. Indeed, in Subsection 2.2, we make the simplifying assumption that the informative spillover only depends on the number of open markets n and not on the quantities sold on these markets. As a consequence there are no externalities through quantities among markets, which ensures that $w_{it} = 0$. If, in contrast, the informative spillover were to depend on the quantity sold on each market, each pair would have an incentive to set a wholesale price lower than the marginal cost in order to increase the quantity bought by each retailer and therefore increase revenues on all other markets. This would, however, not qualitatively change our results.

The above negotiation succeeds if $\upsilon^n > d_i + d_U - \sum_{j=1, j\neq i}^{n} T_{jt}$, i.e. if the bilateral profit expected form an agreement exceeds the sum of status-quo profits. When U bargains with n retailers, each retailer is symmetric in the bargaining and behaves as the marginal retailer in its negotiation with U. Therefore, the corresponding equilibrium tariff, denoted T_t^n, is such that the following equality holds:

$$\upsilon^n - T_t^n - d_i = nT_t^n - d_U. \tag{5}$$

In what follows, we directly refer to the bargaining equation (5) to simplify notations.

There is a discount factor of δ between the two periods. To simplify our analysis, we first assume that firms are myopic, namely $\delta = 0$. This assumption reflects the difficulties of firms to accurately anticipate the shelf-life of a new product. Indeed, it is always possible that a more attractive product is introduced in a future period, thus annihilating the benefits of the former innovation. In contrast, the new product may yield additionnal profits for several periods in a row. In section 6.1 we analyze the complex case in which firms are perfectly forward looking, namely $\delta = 1$, and provide solid insights that our results would then be reinforced.

3 Slotting fees for a new product

In section 3.1 we determine the equilibrium of the bargaining subgames depending on whether the manufacturer has chosen to innovate or not in $t = 1$. We then solve our first stage game in section 3.2 and derive comparative statics in section 3.3.

3.1 Bargaining stage

The manufacturer does not innovate When the manufacturer does not innovate, the two periods are identical. For $t \in \{1,2\}$, the manufacturer bargains with N manufacturers to sell the well-known product of quality q^-. In this case, the revenue in each outlet is υ^-. All negotiations are thus independent of one another, which implies that the tariff is the same regardless of the number of open markets n. As the manufacturer's profit strictly increases with n, U bargains in equilibrium with N retailers. In the negotiation between U and each retailer, outside options are $d_i = 0$ and $d_U = (N-1)\frac{\upsilon^-}{2}$. Therefore, in equilibrium U obtains a profit $N\upsilon^-/2$ and the profit of each retailer $i \in \{1,...,N\}$ is $\upsilon^-/2$.

We denote $\underline{\Pi}$ the equilibrium profit of the manufacturer in any period $t \in \{1,2\}$ when selling the well-known product of quality q^-. We obtain the following lemma:

Lemma 1. *When the manufacturer offers a well-known product over the two periods, its per-period equilibrium profit is $\underline{\Pi} = \frac{N\upsilon^-}{2}$ for any $t \in \{1,2\}$.*

Proof. Straightforward. □

The manufacturer innovates If the manufacturer has innovated at cost K in $t = 1$, due to the spillover, the two periods now differ and we thus solve the game backward. We denote the tariffs and profits respectively by T_t^n and Π_t^n when $n \in \{1,...,N\}$ markets are open in period t.

Assume that the new product was effectively sold in N markets in $t = 1$[19], then, in $t = 2$, regardless of n, the new product generates a revenue υ^N on each market $i \in \{1,...,n\}$ since the informative spillover has already played its role in $t = 1$. Again all negotiations are independent of one another which implies that T_2^n is the same for all $n \in \{1,...N\}$. Still, an important difference remains compared to the case of a well-known product. In case of a breakdown in one pair's negotiation, the manufacturer is still able to bargain over the well-known product with the retailer and therefore i and U respectively obtain a disagreement payoff $d_i = \frac{\upsilon^-}{2}$ and $d_U = \frac{\upsilon^-}{2} + (N-1)T_2^N$. As by assumption $q^+ > q^-$, we have $R^N > N\upsilon^-$. Therefore, because there is extra surplus to share, any negotiation between the manufacturer and a retailer over the new product succeeds, and $\upsilon^N = \frac{R^N}{N}$ is shared according to equation (5). The optimal fixed fee is thus given by:

$$\frac{R^N}{N} - T_2^N - \frac{\upsilon^-}{2} = T_2^N - \frac{\upsilon^-}{2}$$

As the term $\frac{\upsilon^-}{2}$ cancels out, the equilibrium in $t = 2$ is such that N retailers sell the new product and pay the same tariff $T_2^N = \frac{R^N}{2N}$. The manufacturer thus earns a profit $\Pi_2^N = R^N/2$, the profit earned when selling a mature product of quality q^+ through N outlets.

We now solve the negotiation in $t = 1$. In this period, due to the informative spillover, negotiations are no longer independent of one another. In this case, the outside option of U with retailer i amounts to the profit it would earn if it were negotiating with all $n-1$ retailers except for i over

[19]We prove further that if innovation takes place, in $t = 1$ the new good is sold by all N retailers in equilibrium.

the new product, plus the profit obtained from bargaining over the well-known product on market i. The same reasoning applies when U bargains with $n-1$ retailers, etc. Let us thus first consider the case in which U bargains with only one retailer ($n=1$). In this case, both disagreement payoffs are $d_i = d_U = \frac{\upsilon^-}{2}$: U can still bargain with the retailer to sell the well-known product. Equation (5) can be rewritten as follows:

$$R^1 - T_1^1 - \frac{\upsilon^-}{2} = T_1^1 - \frac{\upsilon^-}{2} \tag{6}$$

It is immediate that this negotiation fails when $R^1 \leq \upsilon^-$, and succeeds otherwise. We generalize the breakdown condition in the following lemma:

Lemma 2. *There always exists a cut-off number of retailers $\hat{n} \in \{1, \cdots, N\}$, such that negotiations succeed if and only if the manufacturer bargains with at least $\hat{n}$ retailers. The cut-off level $\hat{n}$ satisfies the following condition:*

$$\upsilon^{\hat{n}-1} \leq \upsilon^- < \upsilon^{\hat{n}} \tag{7}$$

Proof. Straightforward from Assumption 1 since $\upsilon^0 = 0$ and $R^N > N\upsilon^-$. □

Solving the negotiations for all $n \geq \hat{n}$, we determine by recurrence the equilibrium profit depending on $\hat{n}$. The corresponding profit is given by $\Pi_1^n \equiv nT_1^n$. We summarize the equilibrium profit of the manufacturer on the two-period subgame in the following lemma:

Lemma 3. *In case of innovation in $t=1$, the manufacturer bargains with all N retailers in each period $t \in \{1,2\}$, and its profit is $\Pi_1^N = \frac{1}{N+1}\sum_{i=\hat{n}}^N R^i + \frac{\hat{n}(\hat{n}-1)}{N+1}\frac{\upsilon^-}{2}$ in $t=1$ where $\hat{n} \in \{1, \cdots, N\}$ is defined by (7) and $\Pi_2^N = \frac{R^N}{2}$ in $t=2$.*

Proof. We give here a sketch of the proof. If the manufacturer bargains with $\hat{n}$ retailers, the negotiation is as follows:

$$\frac{R^{\hat{n}}}{\hat{n}} - T_1^{\hat{n}} - \frac{\upsilon^-}{2} = \hat{n}T_1^{\hat{n}} - \hat{n}\frac{\upsilon^-}{2}.$$

and the manufacturer obtains the equilibrium profit:

$$\Pi_1^{\hat{n}} = \hat{n}T_1^{\hat{n}}(q^+, q^-) = \frac{R^{\hat{n}}}{\hat{n}+1} + \frac{\hat{n}(\hat{n}-1)}{\hat{n}+1}\frac{\upsilon^-}{2}$$

This is the status-quo profit of the manufacturer when bargaining with $\hat{n}+1$ firms. By recurrence, the manufacturer bargains with N retailers in equilibrium and obtains a profit:

$$\Pi_1^N = \frac{1}{N+1}\sum_{i=\hat{n}}^{N} R^i + \frac{\hat{n}(\hat{n}-1)}{N+1}\frac{\upsilon^-}{2}. \tag{8}$$

Details of the recurrence are provided in Appendix B.1. □

Slotting fees at introduction Because of the spillover which plays a role only in $t=1$, the profit obtained by the manufacturer who sells the new good is different in the two periods.

Proposition 1. *When launching a new product, the manufacturer obtains a smaller profit in $t=1$ than in $t=2$ $\left(\Pi_2^N - \Pi_1^N > 0\right)$ because each retailer is able to extract a slotting fee for the informative spillover it creates on all other markets at the introduction period.*

Proof. Assumption 1 implies that $\frac{R^i}{i} < \frac{R^N}{N}$, $\forall i$. Therefore:

$$\sum_{i=\hat{n}}^{N} R^i < \frac{R^N}{N}\sum_{i=\hat{n}}^{N} i = \frac{(N(N+1)-\hat{n}(\hat{n}-1))R^N}{2N}$$

Besides, we know that $N\upsilon^- < R^N$, and therefore we obtain:

$$\Pi_1^N = \frac{1}{N+1}\sum_{i=\hat{n}}^{N} R^i + \frac{\hat{n}(\hat{n}-1)}{N+1}\frac{\upsilon^-}{2} < \frac{(N(N+1)-\hat{n}(\hat{n}-1))R^N}{2N(N+1)} + \frac{\hat{n}(\hat{n}-1)}{N+1}\frac{R^N}{2N} = \frac{R^N}{2} = \Pi_2^N.$$

□

In order to explain how the retailer is able to capture a rent at the expense of the manufacturer who launches the new product, note first that, since in equilibrium N retailers sell the new product in $t=1$, the joint industry profit is the same in both periods, and equal to R^N. The sharing of this profit, however, is affected in $t=1$ by the informative spillover.

In $t=1$, for any number of open markets n, negotiations are symmetric as each retailer considers itself marginal in its negotiation with the manufacturer. For all $n \geq 2$, in case of a breakdown in the negotiation with one retailer, the profit realized on each remaining market is strictly lower than in case of success, as there is less spillover, i.e. the demand is lower when $n-1$ outlets sell the new product than when n do (from Assumption 1). Because of our renegotiation setting, this is common knowledge to all players, therefore each retailer is able to extract some rent from its marginal extra-contribution (the spillover) to total industry profit.

Note that in a Nash in Nash bargaining setting *à la* Chipty and Snyder (1999), i.e. a bargaining without renegotiation, as a breakdown would not change the equilibrium tariffs paid by all remaining retailers to the manufacturer, the marginal retailer would not be able to extract a rent from the spillover.[20]

As a consequence of the spillover and renegotiation effects, each retailer pays a lower fixed fee to the manufacturer in $t = 1$ than in $t = 2$. Conversely, the manufacturer has to pay slotting fees to each retailer to introduce a new product.

Note here that, in contrast to Shaffer (1991), Marx and Shaffer (2007) and Miklos-Thal *et al.* (2011), slotting fees do not materialize through negative fixed fees in equilibrium, and we do not distinguish formally the franchise fee from a slotting fee in a three-part tariff. In our approach, slotting fees are lump-sum rebates on standard franchise fees that result in lower total payment from the retailer to the manufacturer in the introduction period. We believe that given the lack of information on the contracts signed between manufacturers and retailers it may be difficult in practice to distentangle slotting fees from others franchise fees. In Section 5, we also develop an alternative game in which slotting fees are negative fixed fees which arise explicitely in an upfront bargaining stage as a result of the informative spillover. Making slotting fees explicit then enables us to dicuss some implications of our results for competition policy.

Interestingly, Proposition 1 can be well illustrated through a geometrical analysis. This representation will also be particularly insightful when considering advertising issues in Section 3.3 or retail concentration in Section 4. We draw the total industry revenue as a function of the number of open markets n (in abscissa), that is respectively R^n in $t = 1$ and $\frac{nR^N}{N}$ in $t = 2$ for two different cut-off values, $\hat{n} = 1$ and $\hat{n} = 5$. For simplicity, we will henceforth refer to the graphical representation of the industry revenue function as the "revenue curve", even if the revenue function is discrete. Then, since Assumption 1 implies that $R^i < \frac{i}{N}R^N$, the revenue curve in the presence of a spillover (in $t = 1$) is below the revenue curve without spillover (in $t = 2$).

Graphically, when $\hat{n} = 1$ (the graph on the left in Figure 1) the area below the revenue curves in $t = 1$ is denoted $\mathscr{A}_1^N$. Analytically, $\mathscr{A}_1^N = \sum_{i=1}^N R^i - \frac{R^N}{2} = (N+1)\Pi_1^N - \frac{R^N}{2}$. The area below the

[20]In eq. (5), if the bargaining is simultaneous, $d_i = \frac{v^-}{2}$ and $d_U = \sum_{j \neq i} T_j + \frac{v^-}{2}$, and therefore $T_i = \frac{v^n}{2}$.

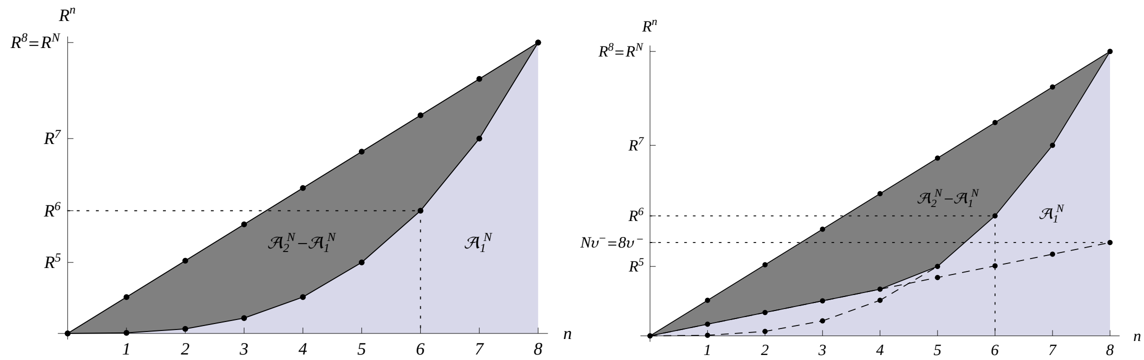

Figure 1: Graphic representation of the revenue curve with or without spillover for $N = 8$. Left: $\hat{n} = 1$; Right: $\hat{n} = 5$.

revenue curve in period 2 is denoted $\mathscr{A}_2^N = \frac{NR^N}{2} = (N+1)\Pi_2^N - \frac{R^N}{2}$. We obtain:

$$\mathscr{A}_2^N - \mathscr{A}_1^N \equiv \sum_{i=1}^{N} \left[\frac{iR^N}{N} - R^i \right] = \frac{R^N}{N} \sum_{i=1}^{N} i - \sum_{i=1}^{N} R^i > 0. \tag{9}$$

Therefore, modulo the multiplication factor $(N+1)$, the difference between the two areas exactly represents the difference between the second- and first-period profits of the manufacturer that is the amount of slotting fees. It is immediate that $\mathscr{A}_2^N - \mathscr{A}_1^N > 0$. The graphical demonstration also extends to any $\hat{n} > 1$ (for instance, on the graph on the right in Figure 1, $\hat{n} = 5$).

Let us now partly relax Assumption 1 by assuming that a new product only needs to be present in a large enough share (lower than 100%) of the market to reach all its potential consumers. For instance assume that the informative spillover entirely disappears once the manufacturer has reached $N-1$ markets in $t = 1$, i.e. $\upsilon^{N-1} = \upsilon^N$. Though there is no extra-contribution of the marginal retailer when bargaining for a new product (as the spillover effect disappears), retailers still obtain slotting fees from the manufacturer. Indeed, because of the cumulative effect of the spillover, the status-quo profit of the manufacturer that results from negotiations with $N-1$ retailers is still lower in $t = 1$ than in $t = 2$. Therefore in equilibrium, the manufacturer still obtains a profit lower than $\frac{R^N}{2}$.[21] Our result is thus robust to such a variation in the spillover effect (the same reasoning applies whenever the spillover stops after $n \geq 2$ successful negotiations).

[21] From eq (5), in $t = 1$, given symmetry among retailers and since $d_i = \frac{\upsilon^-}{2}$ and $d_U = \frac{\upsilon^-}{2} + \Pi_1^{N-1}$, we have $(N+1)T_1^N = \frac{R^N}{N} + \Pi_1^{N-1}$. As long as $\Pi_1^{N-1} < \frac{R^{N-1}}{2}$, that is as long as some spillover exists, the profit of the manufacturer is $NT_1^N < \frac{R^N}{2}$.

3.2 Slotting fees and innovation deterrence

Consider now the decision of the manufacturer to innovate at the first stage in $t = 1$. Note first that an innovation is profitable for the (wholly integrated) industry for any $K < R^N - N\upsilon^-$. Moreover, whenever the innovation is profitable for the industry, it also increases consumer surplus and total welfare.[22]

Given that $\delta = 0$, the manufacturer chooses to innovate if and only if the net benefit it yields in $t = 1$, as compared to selling a well-known good, exceeds the cost of innovation, that is:

$$\Pi_1^N - \underline{\Pi} \geq K,$$

We thus obtain the following proposition:

Proposition 2. *In equilibrium, due to slotting fees, efficient innovations are deterred for any fixed cost of innovation K such that:*

$$K \in \left[\Pi_1^N - \underline{\Pi}, \frac{R^N}{2} - \underline{\Pi}\right].$$

Innovation deterrence always damages consumer surplus and welfare.

Proof. The lower bound is obtained by comparing the manufacturers' profit, with innovation, $\Pi_1^N - K$, and without, $\underline{\Pi}$. The upper bound derives from the comparison of the profit the manufacturer would obtain by selling a new product, with innovation but absent the spillover effect, $\frac{R^N}{2} - K$, and without innovation, $\underline{\Pi}$. □

Proposition 2 shows that the need for the manufacturer to compensate each marginal buyer for the informative spillover deters the introduction of some efficient innovations on the market.

As long as $q^+ > q^-$, when dealing with N retailers we always have $\Pi_1^N > \underline{\Pi}$. Therefore, absent innovation costs, it is always profitable for the manufacturer to introduce the new product when it can use the well-known good as a threat point in its bargaining with the retailers: without innovation cost, an efficient innovation is always launched in equilibrium. However, for any $K \in \left[\Pi_1^N - \underline{\Pi}, \frac{R^N}{2} - \underline{\Pi}\right]$, the cost of innovation is too high compared to the profit of the manufacturer, and the innovation is deterred only because of the spillover.

[22] Spence (1975) shows that innovation can be harmful to consumers when it increases the marginal cost of production for the good. Here, because the cost of innovation is fixed, it is straightforward that any innovation benefits consumers.

Note that a standard hold-up effect arises for $K \in \left[\frac{R^N}{2} - \underline{\Pi}, R^N - N\upsilon^-\right]$. Indeed, even absent spillover, since the manufacturer has to leave half of the rent of innovation to retailers while incurring all the cost, it naturally renounces to invest in this interval.

The deterrence effect of slotting fees paid for the introduction of new products was pointed out by the FTC in its 2003 report on slotting allowances: "*roughly 10 percent of ice cream products fail to earn enough revenue in their first year to cover their slotting fees.*" Innovation deterrence resulting from the slotting fees damages the industry profit: although the manufacturer prefers to sell the well-known good, the loss inflicted on the retailers is clearly larger than the gain for the manufacturer. It also damages consumer surplus because efficient innovation would increase the quality of the product offered to consumers.

3.3 Spillover Intensity and Advertising

We first define a variation in spillover intensity as follows:

Definition 1. *Consider a change in the distribution of revenues from* $\{\upsilon^1, ..., \upsilon^{N-1}, \upsilon^N\}$ *to* $\{\bar{\upsilon}^1, ..., \bar{\upsilon}^{N-1}, \upsilon^N\}$. *The informative spillover decreases if* $\forall n\{1, ..., N-1\}$ $\bar{\upsilon}^n \geq \upsilon^n$ *and* $\exists n\{1, ..., N-1\}$ *such that* $\bar{\upsilon}^n > \upsilon^n$. *Conversely, it increases if* $\forall n \in \{1, ..., N-1\}$ $\bar{\upsilon}^n \leq \upsilon^n$ *and* $\exists n\{1, ..., N-1\}$ *such that* $\bar{\upsilon}^n < \upsilon^n$.

When the informative spillover decreases, information across markets through the sales in retailers' outlets has a smaller role to play to boost demand. Among all potential consumers on a given market, fewer can be captured through word of mouth and/or more consumers are prompt to purchase the new product as soon as it appears in their store. As a result, the gap between the revenue curves on Figure 1 shrinks and we obtain the following corollary:

Corollary 4. *A decrease (resp. increase) in the informative spillover weakly reduces (resp. reinforces) the magnitude of slotting fees,* $\frac{\Pi_2^N - \Pi_1^N}{\Pi_2^N}$, *paid by the manufacturer for the new product introduction. It weakly softens (resp. reinforces) innovation deterrence.*

Proof. See Appendix B.2 □

Consider now that the manufacturer can affect the informative spillover intensity, for instance by launching an advertising campaign to inform consumers about its new product. The stabdard informative advertising model by Grossman and Shapiro (1984), which we introduced in section 2.2, is here useful to present our insights. Let a be the advertising expenditures by the manufacturer. Assume that the probability that a consumer is aware of the existence of the product on each market is a function $\xi(n,a)$ increasing in a. For a given n, a strong level of advertising increases the market revenue $\upsilon^n = \max_{p_i} \xi(n,a) x_i(p_i, q^+)$ and thus decreases the informative spillover. The manufacturer then faces a trade-off between the ex-ante advertising expenditures and the ex-post reduction in slotting fees. We obtain the following corollary:

Corollary 5. *Manufacturers may advertise their new products in order to reduce the magnitude of slotting fees paid to the retailers.*

This result is well illustrated by the findings of the Food Marketing Institute in 2003 which claims that "*Manufacturers that perform thorough market research and support new products with strong advertising campaign often do not pay allowance.*"[23] As Desai (2000), we find that "*advertising and slotting allowance are partial substitutes of one another in the sense that the manufacturer can increase one in order to compensate for a reduction in the other.*"

4 Retail concentration

This section highlights how slotting fees paid by the manufacturer vary with respect to retail concentration. In order to account for a size effect, we assume now that the manufacturer faces symmetric retailers, that each owns s outlets. To simplify the analysis, we assume that the number of outlets is $M = sN$, and therefore N corresponds here to the number of retailers. We also assume that a large retailer bargains over all its outlets at the same time and thus cannot decide to sell the new product in only part of them.[24] Note that we have to modify Assumption 2 as the number of markets is now sN, and therefore we have: $\upsilon^- < \upsilon^{sN}$. As previously, we avoid a size effect through quantities.[25]

[23]FMI,"Slotting Allowances in the Supermarket Industry", section 6, p3.

[24]Regardless of the effect of buyer size on slotting fees, the literature on buyer power highlights various reasons why a large retailer would have an incentive to use its size as a leverage in its bargaining with manufacturers; See for instance Inderst and Wey (2003).

[25]Following remark 1 an immediate consequence of the independence between the level of output and the spillover is that even if one retailer owns two outlets or more, the optimal revenue on each market is independent of the number of outlets it owns.

If $\hat{m}$ denotes the threshold number of oulets below which all negotiations fail, we show that the threshold number of open retailers below which all negotiations fail is $\hat{n} = \lfloor \frac{\hat{m}}{s} + 1 \rfloor$ if $\hat{m}$ is not a multiple of s and $\hat{n} = \frac{\hat{m}}{s}$ otherwise.

We denote by $\Pi_t^{s,n}$ the profit of a manufacturer selling to n retailers each owning s outlets in period t. By recurrence,[26] we obtain the following general formula when the manufacturer faces N retailers of size s (and $M = sN$ outlets):

$$\Pi_1^{s,N} = \frac{1}{N+1} \sum_{i=\hat{n}}^{N} R^{si} + \frac{\hat{n}(\hat{n}-1)}{N+1} \frac{s\upsilon^-}{2} \tag{10}$$

We now compare this profit with the manufacturer's profit obtained with small retailers, that is:

$$\Pi_1^{1,sN} = \frac{1}{sN+1} \sum_{i=\hat{m}}^{sN} R^{i} + \frac{\hat{m}(\hat{m}-1)}{sN+1} \frac{\upsilon^-}{2} \tag{11}$$

It is useful to first note that, because a large retailer bargains over all its outlets at the same time, it applies the average spillover uniformly across its own outlets. Figure 2 is then useful to understand the effect of the buyer size on the bargaining between the retailers and the manufacturer.

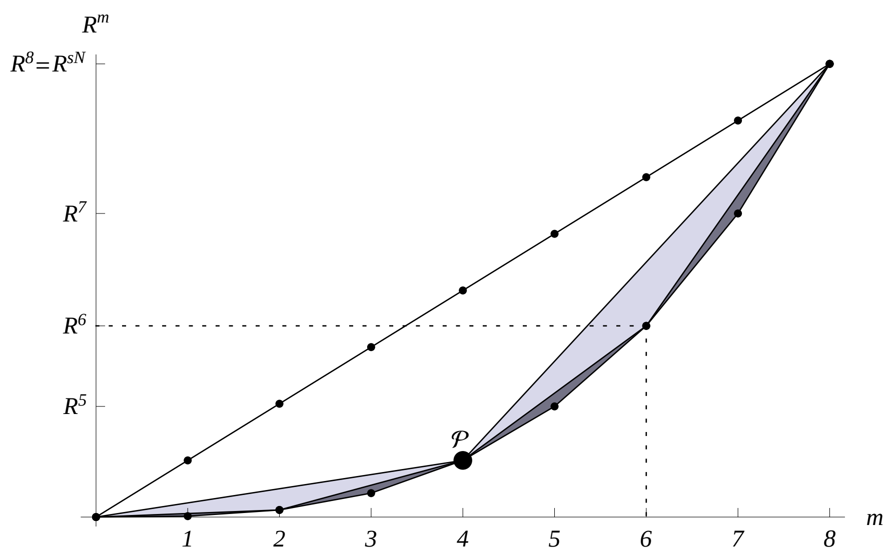

Figure 2: Revenue curves in period 1 for different retail structure (s,N). From top to bottom $(8,1)$, $(4,2)$, $(2,4)$, $(1,8)$.

In Figure 2, we first draw the two curves representing the revenue function considered by $N = 8$

[26] Details are provided in Appendix C.1.

retailers of size $s = 1$ in the first and second period. In $t = 2$ the revenue is the line of equation $m\frac{R^8}{8}$. As mentioned in section 3.2 the area between the two curves represents the amount of slotting fees paid by the manufacturer in $t = 1$.

If the retail market is monopolized, i.e. $N = 1$ and $s = 8$, then in Figure2, the same line of equation $m\frac{R^8}{8}$ represents the revenue function in $t = 1$ and $t = 2$: there are no slotting fees. Indeed, as there is no firm outside the group, the spillover plays no role. Therefore, the monopolization of the retail sector always implies zero slotting fees and thus benefits the manufacturer.

Consider now that $N = 4$ and $s = 2$. In Figure 2, we draw the new revenue function which is above the revenue curve with $N = 8$ retailers of size $s = 1$, the area between the revenue curve of the monnopolized market and the revenue curve that represents the amount of slotting fees shrinks, retail concentration benefits again the manufacturer.

Consider for instance the negotiations for outlets 5 and 6, that is, starting at point $\mathscr{P}$. When the manufacturer bargains with 2 independent outlets, it takes into account the marginal contribution of each outlet, that is $(R^6 - R^5)$. In contrast, when bargaining with a large retailer of size 2, it takes into account the total contribution of the two outlets, that is $(R^6 - R^4)$. Because the revenue curve is convex, the inframarginal contribution is lower than the marginal contribution and therefore the manufacturer must leave a larger share of the revenue to the small outlets. We obtain the following proposition:

Proposition 3. *A manufacturer pays no slotting fee in case of full retail concentration. When the spillover is such that the cumulative revenue function is convex, the magnitude of slotting fees strictly decreases as the size of retail groups increases.*

Proof. See Appendix C.2. □

In contrast, when the revenue curve is not convex (see Figure 3), the large-retailer curve is below the small-retailer curve for some n. Then, the spillover exerted by the group is locally stronger than that of the marginal small retailer. In that case, it is clear that the effect of retail concentration on the manufacturer's profit is ambiguous. Slotting fees may now increase with retail concentration. Note however that sufficient retail concentration always lowers slotting fees as compared with no concentration at all. Again, this result is in line with the FTC report (2003) on slotting allowances which relates that Walmart, the largest retail group in the U.S., is known not

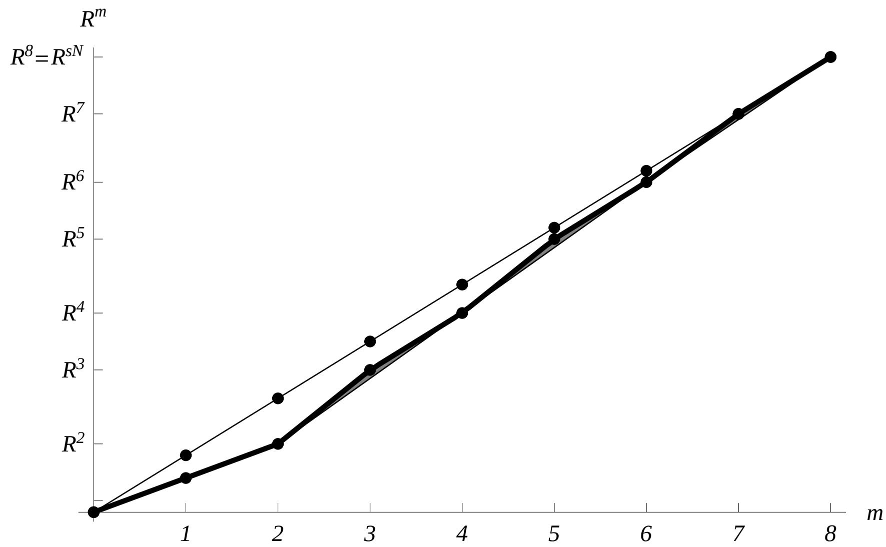

Figure 3: Revenue curves in period 1 for different retail structure (s,N). From top to bottom $(8,1)$, $(1,8)$, $(4,2)$.

to charge slotting fees.

5 Implications for Competition Policy

In our base model, we do not explicitely distinguish slotting fees (paid by the manufacturer to the retailer) from franchise fees (paid by the retailer to the manufacturer): slotting fees are a simple discount on franchise fees. In practice it might be difficult for a court to disentangle different types of transfers between a producer and a retailer which may take the form of under-the-table payments, rebates, or other allowances. However, to properly analyze the effect of a ban on slotting fees and derive the policy implications of our result, we develop here a variant of our base model that enables to formally separate slotting fees (negative upfront fees) from franchise fees.

The stage game is closely inspired from Marx and Shaffer (2010).[27] Assumptions on demand are unchanged. In $t = 1$, Stage 1 is unchanged and Stage 2 and 3 are as follows:

- Stage 2: the manufacturer bargains with each retailer i on slotting fees $S_i \geq 0$ to obtain a slot for its new product. In case of agreement, S_i is paid by the manufacturer to retailer i.

[27]In their setting, take-it-or-leave-it slotting fees are offered in an upfront stage, and then, within the network of selected firms, simultaneous Nash bargaining takes place over two-part tariff contracts.

- Stage 3: the manufacturer bargains simultaneously over a franchise fee F_i with each retailer i to share the market revenue for the new product (resp. well-known good) in case of agreement (resp. disagreement) in Stage 2.

The total transfer from retailer i to the manufacturer is thus $T_i = F_i - S_i$. We solve the game in $t = 1$.

In Stage 3, if n retailers have sucessfully bargained over the sale of the new product in Stage 2, $(N-n)$ retailers have failed and still offer the well-known product. Assuming that the successful retailers are the first n retailers, the manufacturer simultaneously bargains over $\frac{R^n}{n}$ with each $i \in \{1,...,n\}$ and over υ^- with each $i \in \{n+1,...,N\}$. As a consequence there are two equilibrium tariffs, which we denote F^S for "successful" retailers who launch the new product and F^F for retailers with which the bargaining "failed". These tariffs are given by:

$$\frac{R^n}{n} - F^S = F^S \;\Rightarrow\; F^S = \frac{R^n}{2n}, \qquad \upsilon^- - F^F = F^F \;\Rightarrow\; F^F = \frac{\upsilon^-}{2}.$$

Therefore, if n retailers have successfully bargained over slotting fees in Stage 2, the equilibrium profit of the manufacturer is $\Pi^n = \frac{R^n}{2} + (N-n)\frac{\upsilon^-}{2}$, a successful retailer obtains $\pi^{nS} = \frac{R^n}{2n} + S_i^n$ whereas, a retailer who failed gets $\pi^{nF} = \frac{\upsilon^-}{2}$.

In Stage 2, If U bargains successfully with n retailers, each retailer is symmetric in the bargaining and behaves as the marginal retailer in its negotiation with U. The corresponding symmetric equilibrium slotting fee is denoted S^n.

We first write the negotiation between the manufacturer and one retailer when all the other have failed:

$$\left(\pi^{1S} + S^1\right) - \pi^{0F} = \left(\Pi^1 - S^1\right) - \Pi^0.$$

The left-hand-side term represents the profit earned by the retailer in case of an agreement with the manufacturer in Stage 2, $\pi^{1S} + S^1$, minus its profit without agreement, π^{0F}. The right-hand-side term represents the profit earned by the manufacturer in case of agreement with retailer 1, $\Pi^1 - S^1$, minus its profit in case of failure, Π^0. Assuming that $R^1 > \upsilon^-$, i.e. that $\hat{n} = 1$, we obtain $S^1 = 0$.

Now, if the manufacturer bargains with two retailers while all other negotiations have failed, the negotiation is as follows:

$$\left(\pi^{2S}+S^2\right)-\pi^{1F}=\left(\Pi^2-2S^2\right)-\left(\Pi^1-S^1\right) \quad \Rightarrow \quad S^2=\frac{R^2}{12}-\frac{R^1}{6}.$$

When 2 firms have accepted to launch the new product, the manufacturer therefore obtains :

$$\Pi^2=\frac{R^1+R^2}{3}+(N-2)\frac{\upsilon^-}{2}$$

Solving the recurrence, it is then straightforward that the manufacturer pays a slotting fee to each of the N firms in equilibrium and gets the Shapley value, $\Pi^N=\frac{1}{N+1}\sum_{i=1}^n R^i$. Note that, as in the previous sections, this result generalizes to any $\hat{n}>1$.

In period $t=2$, playing stages 2 and 3 again, there is no informative spillover left and it is straightforward that slotting fees in equilibrium are therefore 0. We obtain the following proposition:

Proposition 4. *When launching a new product, the manufacturer pays a slotting fee to the retailer at product introduction as a result of the informative spillover the retailer creates on all other markets.*

Propositions 2 to 3 also hold in this new setting. We have now explicitely distinguished slotting fees paid by the manufacturer to the retailer from the franchise fee paid by the retailer to the manufacturer. We can therefore derive the consequences of a ban on slotting fees. Assume that a ban imposes that $S_i=0$. Keeping our game unchanged, in Stage 3, franchise fees are, again, F^S for retailers who agreed to launch the new product, and F^F for those who did not. Profits are respectively π^{nS} and π^{nF}. In Stage 2, because no slotting fee can be negotiated, a retailer accepts to launch the new product as long as $\pi^{nS}>\pi^{nF}$, which is always the case for $n=N$. Therefore, in case of a ban on slotting fees, the manufacturer obtains $\frac{R^N}{2}>\Pi^N$.

As a consequence, in terms of competition policy our argument calls for a ban on slotting fees: whenever innovation deterrence occurs, a ban on slotting fees would benefit all parties, i.e. consumers and the manufacturer but also retailers. Indeed, if it were possible, the retailer would commit itself to not using slotting fees before the manufacturer decides to innovate. If innovation occurs absent the ban, then banning slotting fees would hurt the retailer.

6 Robustness

6.1 Firms are forward looking

If we assume that $\delta = 1$, then in $t = 1$ firms are able to take into account in their bargaining the future net gain (or loss) in $t = 2$. In a context without myopia, we can rewrite the bargaining program in $t = 1$, that is equation (5), as follows:

$$\frac{R^n}{n} - T_1^n - d_i + \Delta_i^n = nT_1^n - d_U + \Delta_U^n \tag{12}$$

We neglect the well-known good in this section and set $d_i = 0$. The outside option of the manufacturer, d_U is determined as before by solving the nested negotiations. Finally, Δ_i^n and Δ_U^n are the respective net gain (or loss) of retailer i and the manufacturer in $t = 2$ if the n^{th} negotiation in $t = 1$ succeeds rather than breaks.

In order to solve the negotiation program for a given value of n we must first compute the values of Δ_i^n and Δ_U^n, which we derive from the subgame equilibrium of period $t = 2$. Let $n_1 \leq N$ be the number of successful negotiations in period $t = 1$. Any negotiation program in $t = 2$, involves a number n_2^S (resp. n_2^F) of firms with which the negotiation succeeded (resp. failed) in $t = 1$. By assumption, we have $n_2^S \leq n_1$ and $n_2^F \leq N - n_1$. For any vector (n_1, n_2^S, n_2^F), $T_2^S(n_1, n_2^S, n_2^F)$ (resp. $T_2^F(n_1, n_2^S, n_2^F)$) is the tariff paid in $t = 2$ by a retailer with which negotiation in $t = 1$ was successful (resp. failed), with $n_2^S + n_2^F \leq N$ the number of negotiations that succeed in $t = 2$.

Let $\Pi_2(n_1, n_2^S, n_2^F)$, $\pi_2^S(n_1, n_2^S, n_2^F)$ and $\pi_2^F(n_1, n_2^S, n_2^F)$ respectively be the profits of the manufacturer, of a successful retailer in $t = 1$ and of a retailer who failed in $t = 1$, when bargaining in $t = 2$.

By definition, we have:

$$\Pi_2(n_1, n_2^S, n_2^F) = n_2^S T_2^S(n_1, n_2^S, n_2^F) + n_2^F T_2^F(n_1, n_2^S, n_2^F), \tag{13}$$

$$\pi_2^S(n_1, n_2^S, n_2^F) = \frac{R^{n_1 + n_2^F}}{n_1 + n_2^F} - T_2^S(n_1, n_2^S, n_2^F), \tag{14}$$

$$\pi_2^F(n_1, n_2^S, n_2^F) = \frac{R^{n_1 + n_2^F}}{n_1 + n_2^F} - T_2^F(n_1, n_2^S, n_2^F). \tag{15}$$

Note that the per-market revenue shared in $t=2$ is $\frac{R^{n_1+n_2^F}}{n_1+n_2^F}$ which is independent of n_2^S. Indeed, regardless of the number of firms $n_2^S \leq n_1$ that actually succeed in their negotiation with the manufacturer in $t=2$, their informative spillover has played its role in $t=1$. Only firms that have failed in $t=1$ and now succeed in $t=2$, i.e. n_2^F firms trigger an informative spillover that increases the per-market revenue in $t=2$. As a consequence, firms are asymmetric in $t=2$ and for all relevant values of n_2^S and n_2^F, tariffs $T^S(n_1,n_2^S,n_2^F)$ and $T^F(n_1,n_2^S,n_2^F)$ are the solution to the following system of bargaining equations:

$$
\begin{aligned}
\pi_2^S(n_1,n_2^S,n_2^F) &= \Pi_2(n_1,n_2^S,n_2^F) - \Pi_2(n_1,n_2^S-1,n_2^F), && (16)\\
\pi_2^F(n_1,n_2^S,n_2^F) &= \Pi_2(n_1,n_2^S,n_2^F) - \Pi_2(n_1,n_2^S,n_2^F-1)., && (17)\\
\Pi_2(n_1,0,0) &= 0
\end{aligned}
$$

In $t=1$, for a given number of firms n, the tariff T_1^n is the solution of the negotiation program given by equation (12), with $\Delta_1^n = \pi_2^S(n,n,N-n) - \pi_2^F(n-1,n-1,N-n+1)$, $\Delta_U^n = \Pi_2(n,n,N-n) - \Pi_2(n-1,n-1,N-n+1)$ and $d_U = (n-1)T_1^{n-1}$.

We now solve the negotiation in $t=1$, as defined by equation (12), in two polar cases, namely (i) when all but one negotiation have failed ($n=1$), i.e. the first of all nested negotiations that takes place in $t=1$ and (ii) when all but one negotiation have succedeed ($n=N-1$), i.e. the last of all nested negotiations in $t=1$. These two specific cases are sufficient to provide solid insights that if firms were forward looking, our results would be reinforced: the rent extracted by the retailers at product introduction would further increase.

Negotiation in $t=1$ when only one firm succeeds. Starting from a situation in which all firms but one, say retailer 1, have failed in their negotiation in $t=1$, $d_U=0$ and the negotiation is:

$$R^1 - T_1^1 + \Delta_1^1 = T_1^1 + \Delta_U^1$$

We then obtain the following lemma:

Lemma 4. *If all but one negotiations have failed in $t=1$, $\Delta_1^1 < \Delta_U^1$, which implies that the out-of-equilibrium profit of the manufacturer when firms are forward looking is strictly lower than when* *firms are myopic.*

Proof. See Appendix D.1. □

If $\Delta_1^1 - \Delta_U^1 < 0$, then the manufacturer has a higher gain from trade in $t = 1$ with retailer 1 when firms are forward looking rather than myopic: the manufacturer therefore earns a lower profit. The economic insight is clear. In case of breakdown between retailer 1 and the manufacturer in $t = 1$, all the informative spillover remains to play a role in $t = 2$ which weakens the manufacturer towards retailers in $t = 2$. Therefore, the manufacturer has a higher gain from trade than the retailer in $t = 1$.

Negotiation in $t = 1$ when all but one firm have succeeded. Starting now from a situation in which all firms but one, say retailer 1, have already succeeded in their negotiation in $t = 1$, the negotiation is:

$$\frac{R^N}{N} - T_1^N + \Delta_1^N = NT_1^N - d_U + \Delta_U^N$$

We then obtain the following lemma:

Lemma 5. *If all but one negotiation have succeeded in $t = 1$, $\Delta_1^N < \Delta_U^N$, which implies that, assuming that d_U is not higher than the status-quo in the case of myopia, the resulting equilibrium profit of the manufacturer is strictly lower than in the case of myopia.*

Proof. See Appendix D.2. □

From the first nested negotiation, $\Delta_1^1 < \Delta_U^1$ implies that d_U is lower for $n = 2$ when firms are forward looking than when they are myopic. Therefore, for subsequent nested negotiations, we believe that two effects combine: for all $n \in \{1, \cdots, N\}$ we will still have $\Delta_1^n - \Delta_U^n < 0$, which will further increase the manufacturer's profit loss in $t = 1$ as compared to the case with myopia; In addition, the status-quo profit of the manufacturer in each subsequent negotiation is lower absent myopia than with myopia. Both these conjectures are true in particular for $N \in \{2, 3, 4\}$ (See Appendix D).

6.2 Retail Competition

We now test the robustness of our analysis when considering markets in which several firms compete. Assume that there exist $i \in \{1,2,3,4\}$ outlets and $j \in \{1,2\}$ markets. We consider the same stage game as in section 2.3 and add a third stage in which outlets $i = 1,2$ (resp. $i = 3,4$) compete à la Cournot on market 1 (resp. market 2).

We here follow the specification presented in section 2.2. In the absence of spillover, the inverse demand function is $P_j(Q) = q^+ - X_j$, with $X_j = x_{ij} + x_{-ij}$ the total output sold on market j. With spillovers represented by $\xi(n)$, the inverse demand function becomes $P_j(Q) = q^+ - \frac{X_j}{\xi(n)}$. We use the following specification of the spillover: $\xi(n) = \frac{n}{N}$, with $N = 4$ in our case.[28] We also assume from now on that $q^+ = 1$ and that the total profit obtained with the old product is 0.

No spillover ($t = 2$). Assume first that the manufacturer has innovated in $t = 1$. If there is only one firm i in market j, i maximizes $x_{ij}(1 - x_{ij})$, and thus sets $x_{ij} = 1/2$ which generates a revenue $1/4$. If two retailers are active in market j, each retailer i maximizes $x_{ij}(1 - (x_{ij} + x_{-ij}))$ and thus sets $x_{ij} = 1/3$ for all i and j. The revenue generated by each retailer is $1/9$ and the total revenue in market j is $2/9$.

Lemma 6. *In equilibrium, in $t = 2$, the manufacturer obtains a profit $\Pi_2^{2,2} = 17/54$.*

Proof. See Appendix E.1. □

With spillovers ($t = 1$). Assume that U chooses to innovate in $t = 1$. In Stage 3, output choices not only depend on the market structure, but also on the spillover.

If all but one negotiation, say with 1, have failed, 1 is a monopoly on its market, and the spillover is $\xi(1) = 1/4$. Retailer 1 thus maximizes $x_1(1 - 4x_1)$ and sets $x_1 = 1/8$ and the revenue on market 1 (and for the whole industry) is $\frac{1}{8}\left(1 - 4\frac{1}{8}\right) = \frac{1}{16}$.

Applying the same reasoning for all market structures, we summarize the revenue at each outlet in the following table. Lines represent the number of open outlets in the market we consider, whereas columns represent the number of open outlets in the other market. This way, we characterize the revenue in an outlet for all possible market structures. For instance, $1/12$ (respectively

[28] For the sake of simplicity, the spillover an outlet generates is the same towards its direct rivals or outlets in the other markets.

3/16) is the revenue in outlet 1 when both outlets are open in market 1 (resp. 2) and only one is open in market 2 (resp. 1).

	0	1	2
1	1/16	1/8	3/16
2	1/18	1/12	1/9

Table 1: Revenue from the new product in each outlet depending on the market structure.

Lemma 7. *In equilibrium, in $t = 1$, the manufacturer obtains a profit $\Pi_1^{2,2} = 23/108$.*

Proof. See Appendix E.2 □

Comparing the profit of the manufacturer in both periods, we obtain the following proposition:

Proposition 5. *Retailers still manage to extract a slotting fee from the manufacturer at product launching, despite the competitiveness of the market.*

Proof. Straightforward from lemmas 6 and 7. □

Therefore, in a framework with relatively soft competition among stores, our main results hold. Our results are unchanged when running the same analysis for three firms competing on each markets.[29] When competition becomes more intense on each market, however, it may become optimal for the manufacturer to provoke a breakdown in bargaining with a subset of retailers in order to limit the opportunism effect (see Chambolle and Villas-Boas, 2015). Moreover, if consumers are heterogeneous in their valuation for quality, a differentiation issue could arise. However as long as innovation is drastic our results would remain unchanged.

6.3 A new product is launched by an entrant

Assume now that the new product of quality q^+ is launched by a potential entrant, denoted E, in period $t = 1$, while the incumbent manufacturer, denoted I, cannot innovate and therefore at best sells the well-known good. We denote by $\tilde{T}_t^n$ the equilibrium tariff paid by each retailer to E in period t when n markets are open, $\tilde{\Pi}_t^n$ the corresponding profit of the entrant.

[29] Details about this case are available upon request.

In $t = 2$, if E entered in $t = 1$, then we prove further that its product is sold in N markets in $t = 1$. Therefore in $t = 2$, E sells a mature good which generates a revenue $\frac{R^N}{N}$ on each market. Since negotiations are independent of one another, the equilibrium tariff $\tilde{T}_2^n$ for all n is determined by the following equation :

$$\frac{R^N}{N} - \tilde{T}_2^n - \frac{\upsilon^-}{2} = \tilde{T}_2^n \Leftrightarrow \tilde{T}_2^n = \frac{1}{2N}\left(R^N - \frac{N\upsilon^-}{2}\right).$$

and in equilibrium E obtains:

$$\tilde{\Pi}_2^N \equiv N\tilde{T}_2^N = \frac{1}{2}\left(R^N - \frac{N\upsilon^-}{2}\right) \tag{18}$$

In $t = 2$, the profit obtained by E is lower than the profit obtained by an innovative incumbent ($\tilde{\Pi}_2^N < \Pi_2^N$), because E has no status-quo profit whereas the innovative incumbent could still obtain a positive profit from selling the product of quality q^-.

Now, in $t = 1$, if all negotiations but one have failed with E, the optimal fixed fee denoted $\tilde{T}_1^1$ is given by:

$$R^1 - \tilde{T}_1^1 - \frac{\upsilon^-}{2} = \tilde{T}_1^1 \Leftrightarrow \tilde{T}_1^1 = \frac{1}{2N}\left(R^1 - \frac{N\upsilon^-}{2}\right). \tag{19}$$

This negotiation breaks if $R^1 \leq \frac{\upsilon^-}{2}$. Therefore, as in the previous case, there exists a cut-off value $\tilde{n}$ that represents a minimum number of negotiations that must take place in order to succeed. Here, the cut-off value is defined by:

$$\frac{R^{\tilde{n}-1}}{\tilde{n}-1} \leq \frac{\upsilon^-}{2} < \frac{R^{\tilde{n}}}{\tilde{n}} \tag{20}$$

Comparing eqs (7) and (20), we have $\tilde{n} \leq \hat{n}$: the sum of status-quo profits is lower ($d_i + d_U = \frac{\upsilon^-}{2}$) in a negotiation involving the entrant, while the revenue to be shared is unchanged. By recurrence, we determine the profit earned by E in $t = 1$ with $n \geq \tilde{n}$ retailers :

$$\tilde{\Pi}_1^n \equiv \frac{1}{n+1}\left(\sum_{i=\tilde{n}}^{n} R^i - \frac{n(n+1) - \tilde{n}(\tilde{n}-1)}{2}\frac{\upsilon^-}{2}\right) \tag{21}$$

As N firms bargain with E in equilibrium, E obtains $\tilde{\Pi}_1^N < \Pi_1^N$. Indeed, despite the fact that $\tilde{n} < \hat{n}$, the absence of status-quo for the entrant still prevails and it gets a lower share of the joint profit in equilibrium. We summarize our results in the following proposition:

Proposition 6. *Due to slotting fees efficient innovations by an entrant are deterred for any innovation cost such that* $K \in \left[\tilde{\Pi}_1^N, \tilde{\Pi}_2^N\right]$. *A new entrant always has higher incentives to launch a new product than an incumbent manufacturer.*

Proof. See Appendix F. □

Our proposition confirms that slotting fees may also have a deterrence effect on innovation by an entrant. It is easier, however, for an entrant than an incumbent to launch a new product. Two forces are in balance to explain that second result.

Although $\tilde{\Pi}_1^N < \Pi_1^N$, absent the cost K, E has an incentive to launch the new product as soon as it yields a positive profit. In contrast, the incumbent firm must ensure that it yields a larger profit than $\underline{\Pi}$ and thus $\tilde{\Pi}_1^N > \Pi_1^N - \underline{\Pi}$ which means that the Arrow replacement effect reduces the net gain of launching a new product for the incumbent.

7 Conclusion

This paper provides new theoretical grounds for the payment of slotting fees by the manufacturer when introducing a new product. Each retailer is able to obtain a rent - a slotting fee - from the manufacturer in exchange for the informative spillover it creates on all other markets by selling the new product.

Our main result constitutes an interesting twist as compared to the existing literature. Indeed, the literature that explains slotting fees by information issues related to the new product introduction mostly enhances efficiency effects. In contrast, the presence of an informative spillover that relies on the diffusion of information on the existence of the product to consumers deters efficient innovation and reduces industry profits and consumer surplus. Moreover, if a large literature rather confirms that retail concentration increases buyer power, we show in our model that slotting fees decrease with retail concentration under reasonable conditions. The main insight is that when the size of retail groups increases, the number of outlets outside of each group, that is on which the informative spillover is exerted, decreases. We have also shown that our results were robust to retail competition, to firms being forward looking and when the innovator is an entrant rather than an incumbent.

In terms of competition policy, our argument adds on to the list of harmful effects of slotting fees highlighting an innovation deterrence effect **X**. We also show that small manufacturers who cannot advertise their new products at low costs are likely to pay more slotting fees to retailers and thus to be hurt by slotting fees. Finally, according to the EU report on Unfair Trade Practices, "one party should not ask the other party for advantages or benefits of any kind without performing a service related to the advantage or benefit asked".[30] In our model, it is not the retailer who performs the informative spillover but rather the consumers through word-of-mouth. As this service is only a by-product of the retailer's activity, slotting fees could be here considered as an unfair trading practice.

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[30] See §88 of the "Report from the Commission to the European Parliament and the council on unfair business-to-business trading practices in the food supply chain", COM(2016)32.

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Appendix

A Assumption 1' and Assumption 1

We define $p_i^*(q,n)$ as follows:

$$p_i^*(q,n) \equiv \arg\max_{p_i} X_i(q,n,p_i)p_i$$

Following equation (3), we can write:

$$\begin{aligned}
\upsilon^n - \upsilon^{n-1} &= X_i(q^+,n,p_i^*(q^+,n))p_i^*(q^+,n) - X_i(q^+,n-1,p_i^*(q^+,n-1))p_i^*(q^+,n-1) \\
&= \underbrace{X_i(q^+,n,p_i^*(q^+,n))p_i^*(q^+,n) - X_i(q^+,n,p_i^*(q^+,n-1))p_i^*(q^+,n-1)}_{(i)} \\
&+ \underbrace{[X_i(q^+,n,p_i^*(q^+,n-1)) - X_i(q^+,n-1,p_i^*(q^+,n-1))]p_i^*(q^+,n-1)}_{(ii)} \geq 0
\end{aligned}$$

(i) cannot be negative because $p_i^*(q^+,n)$ maximizes $X_i(q^+,n,p_i)p_i$. (ii) is non negative because of Assumption 1': since $\xi(n) \geq \xi(n-1)$, $X_i(q^+,n,p_i)$ is non decreasing with respect to n. Assumption 1' thus implies Assumption 1.

B Proofs of Section 3

B.1 Proof of Lemma 3

If the manufacturer bargains with $\hat{n}$ retailers in $t=1$, with $\hat{n}$ defined by (7), the negotiation with the $\hat{n}^{\text{th}}$ retailer for a tariff $T_1^{\hat{n}}$ is as follows:

$$\frac{R^{\hat{n}}}{\hat{n}} - T_1^{\hat{n}} - \frac{\upsilon^-}{2} = \hat{n}T_1^{\hat{n}} - \hat{n}\frac{\upsilon^-}{2}.$$

and the manufacturer obtains:

$$\Pi_1^{\hat{n}} \equiv \hat{n}T_1^{\hat{n}} = \frac{R^{\hat{n}}}{\hat{n}+1} + \frac{\hat{n}(\hat{n}-1)}{\hat{n}+1}\frac{\upsilon^-}{2}.$$

This profit is the status-quo profit of the manufacturer in its bargaining with $\hat{n}+1$ retailers. Assume that when U bargains with $n > \hat{n}$ retailers, we have:

$$\Pi_1^n = \frac{1}{n+1}\sum_{i=\hat{n}}^{n} R^i + \frac{\hat{n}(\hat{n}-1)}{n+1}\frac{\upsilon^-}{2}$$

When bargaining with $n+1$ retailers, the negotiation is as follows:

$$\left(\frac{R^{n+1}}{n+1} - T_1^{n+1}\right) - \frac{\upsilon^-}{2} = (n+1)T_1^{n+1} - \Pi_1^n - \frac{\upsilon^-}{2}.$$

X We obtain:

$$(n+2)T_1^{n+1} = \frac{1}{n+1}\sum_{i=1}^{n+1} R^i - \frac{\hat{n}(\hat{n}-1)}{n+1}\frac{\upsilon^-}{2}.$$

As $\Pi_1^{n+1} = (n+1)T_1^{n+1}$, we obtain:

$$\Pi_1^{n+1} = \frac{1}{n+2}\sum_{i=\hat{n}}^{n+1} R^i + \frac{\hat{n}(\hat{n}-1)}{n+2}\frac{\upsilon^-}{2}.$$

By recurrence, we thus have shown that the equilibrium profit of the manufacturer when he bargains with all N retailers is the expression given in eq. (8), that is:

$$\Pi_1^N = \frac{1}{N+1}\sum_{i=\hat{n}}^{N} R^i + \frac{\hat{n}(\hat{n}-1)}{N+1}\frac{\upsilon^-}{2}.$$

B.2 Proof of Corollary 4

When the informative spillover decreases, from equation (1), the industry revenue becomes $\overline{R}^n \geq R^n$ for all $n \in [1, N-1]$ and $\exists n \leq N-1$ such that $\overline{R}^n > R^n$. Note that, since in $t = 2$ the profit of the manufacturer does not depend on the spillover intensity, the variation in the magnitude of slotting fees is fully explained by the impact of the spillover intensity on the profit of the manufacturer in

$t = 1$, that is:

$$\Pi_1^N = \frac{1}{N+1}\sum_{i=\hat{n}}^{N} R^i + \frac{\hat{n}(\hat{n}-1)}{N+1}\frac{\upsilon^-}{2}.$$

Then, there are three cases:

- First, if $\frac{\overline{R}^n}{n} > \frac{R^n}{n}$ only for $n < \hat{n}$ and $\hat{n}$ is unchanged, the change does not affect the manufacturer's profit. Indeed, the term $\frac{1}{N+1}\sum_{i=\hat{n}}^{N} R^i$ is not affected and the second term is by definition independent of the spillover.

- Second, if $\frac{\overline{R}^n}{n} > \frac{R^n}{n}$ for $n < \hat{n}$ and $\hat{n}$ decreases as a result of the decrease in spillover, the profit of the manufacturer increases. Indeed, assume that initially $\hat{n} = k$, and only R^{k-1} changes and is now equal to $\overline{R}^{k-1}$, so that the new threshold is $\overline{\hat{n}} = k-1$. **Then, the new profit of the manufacturer is:**

$$\frac{1}{N+1}\sum_{i=k}^{N} R^i + \frac{\overline{R}^{k-1}}{N+1} + \frac{(k-1)(k-2)\upsilon^-}{2(N+1)} > \frac{1}{N+1}\sum_{i=k}^{N} R^i + \frac{k(k-1)\upsilon^-}{2(N+1)},$$

  because $\frac{\overline{R}^{k-1}}{k-1} > \upsilon^-$**.**

- Finally, if there exists $n \geq \hat{n}$ such that $\frac{\overline{R}^n}{n} > \frac{R^n}{n}$, it is immediate that the profit of the manufacturer increases, as $\frac{1}{N+1}\sum_{i=\hat{n}}^{N} \overline{R}^i > \frac{1}{N+1}\sum_{i=\hat{n}}^{N} R^i$ whereas the second term is unchanged.

C Proofs of section 4

C.1 Equilibrium profits

In what follows we have $\upsilon^- < \upsilon^{sN}$. In $t = 1$, for any negotiation with less than $\hat{n}$ retailers, all negotiations fail, which means that each retailer leaves half of its revenue to the manufacturer:

$$\Pi_1^{s,n} = n \times \frac{s\upsilon^-}{2} \;\; \forall n < \hat{n}.$$

The profit of each retailer of size s is then $\frac{s\upsilon^-}{2}$.

Consider now the retailer negotiates with $\hat{n}$ retailers, the threshold number of retailers that

ensures that all the $\hat{n}^{\text{th}}$ retailers sell the new product. The negotiation program is then:

$$\frac{R^{\hat{n}}}{\hat{n}} - T_1^{s,\hat{n}} - s\frac{\upsilon^-}{2} = \hat{n}T_1^{s,\hat{n}} - \hat{n}s\frac{\upsilon^-}{2}$$

which yields:

$$T_1^{s,\hat{n}} = \frac{1}{\hat{n}+1}\left(\frac{R^{s\hat{n}}}{\hat{n}} + \frac{\hat{n}-1}{\hat{n}+1}\frac{s\upsilon^-}{2}\right), \qquad \Pi^{s,\hat{n}} = \hat{n}T_1^{s,\hat{n}} = \frac{R^{s\hat{n}}}{\hat{n}+1} + \frac{\hat{n}(\hat{n}-1)}{\hat{n}+1}\frac{s\upsilon^-}{2}.$$

Assume now that there exists $n \geq \hat{n}$ such that:

$$\Pi_1^{s,n} = \frac{1}{n+1}\sum_{i=\hat{n}}^{n} R^{si} + \frac{\hat{n}(\hat{n}-1)}{n+1}\frac{s\upsilon^-}{2}$$

Consider now the $(n+1)^{\text{th}}$ negotiation. The program is given by:

$$\frac{R^{s,n+1}}{n+1} - T_1^{s,n+1} - \frac{s\upsilon^-}{2} = (n+1)T_1^{s,n+1} - \Pi_1^{s,n} - \frac{s\upsilon^-}{2}$$

This yields:

$$(n+2)T_1^{s,n+1} = \frac{1}{n+1}\sum_{i=\hat{n}}^{n+1} R^{si} + \frac{\hat{n}(\hat{n}-1)}{n+1}\frac{s\upsilon^-}{2}, \qquad \Pi_1^{s,n+1} = \frac{1}{n+2}\sum_{i=\hat{n}}^{n+1} R^{si} + \frac{\hat{n}(\hat{n}-1)}{n+2}\frac{s\upsilon^-}{2}.$$

Hence the expression of the profit given in eq. (10).

C.2 Proof of proposition 3

In case of full monopolization of the retail sector, the manufacturer obtains $\Pi_1^{sN,1} = \frac{R^{sN}}{2}$ in $t = 1$ which is exactly the profit obtained by the manufacturer in $t = 2$: the manufacturer pays no spillover. We now show that retail concentration always benefits the manufacturer when the revenue curve R^i is weakly convex.

Let us first assume that $\hat{m} = 1$. The difference between profits of the manufacturer when it faces a large retailer vs. s small retailers, given respectively by (10) and (11), is of the same sign as the following expression:

$$\Delta = (sN+1)\sum_{i=1}^{N} R^{si} - (N+1)\sum_{i=1}^{sN} R^i.$$

We first show that the manufacturer always obtains a strictly higher profit when bargaining with the first group of size s rather than with the corresponding s independent outlets.
If $N=1$, that is in the bargaining with the first group of $s>2$ outlets, we obtain:

$$\Delta = (s+1)R^s - 2\sum_{i=1}^{s} R^i = \sum_{i=1}^{s}[2i-(s+1)](R^i - R^{i-1}).$$

Therefore if the function R^i is weakly convex in i $\forall i \in [1,s]$, we have $R^{i+1}-R^i \geq R^i - R^{i-1}$. **X** If s is uneven, the above expression can be rewritten:

$$\Delta = \sum_{i=1}^{\frac{s+1}{2}-1} [(s+1)-2i]\left[(R^{s-i+1}-R^{s-i})-(R^i-R^{i-1})\right] > 0.$$

If, now, s is even, the above expression can be rewritten:

$$\Delta = \sum_{i=1}^{\frac{s}{2}} [(s+1)-2i]\left[(R^{s-i+1}-R^{s-i})-(R^i-R^{i-1})\right] > 0.$$

We then have that for any group of size s the first negotiation with one group of size s generates a strictly higher profit for the manufacturer than negotiating with s separated retailers as long as R^i is weakly convex in i.
We now consider further negotiations with groups of size s, and show this result for all values of s and N, by first expressing Δ as a function of revenue differences $R^m - R^{m-1}$ for all $m \in [1, sN]$. Δ can be written as follows:

$$\Delta = \sum_{n=1}^{N}\left[(s-1)NR^{sn} - (N+1)(N+1)\sum_{k=1}^{s-1} R^{sn-k}\right].$$

X From this, we first derive the coefficient for the term $(R^{sN}-R^{sN-1})$:

$$\begin{aligned}
\Delta &= (s-1)N(R^{sN}-R^{sN-1}) + [(s-2)N-1]R^{sN-1} - (N+1)\sum_{k=2}^{s-1} R^{sN-k} \\
&\quad + \sum_{n=1}^{N-1}\left[(s-1)NR^{sn} - (N+1)(N+1)\sum_{k=1}^{s-1} R^{sn-k}\right].
\end{aligned}$$

X

Repeating the same reasoning, we obtain the coefficient for the term $(R^{sN-1}-R^{sN-2})$:

$$\begin{aligned}\Delta \;=\;& (s-1)N(R^{sN}-R^{sN-1})+[(s-2)N-1](R^{sN-1}-R^{sN-2})+[(s-3)N-2]R^{sN-2} \\ & -(N+1)\sum_{k=3}^{s-1}R^{sN-k}+\sum_{n=1}^{N-1}\left[(s-1)NR^{sn}-(N+1)(N+1)\sum_{k=1}^{s-1}R^{sn-k}\right].\end{aligned}$$

The same reasoning can be applied to Δ up to the $s(N-1)^{th}$ term and we then obtain the following expression:

$$\Delta=\sum_{k=1}^{s}[(s-k)N-(k-1)]\left(R^{sN-k+1}-R^{sN-k}\right)+\sum_{n=1}^{N-1}\left[(s-1)NR^{sn}-(N+1)(N+1)\sum_{k=1}^{s-1}R^{sn-k}\right].$$

We now determine the coefficient for the term $(R^{s(N-1)}-R^{s(N-1)-1})$:

$$\begin{aligned}\Delta=&\sum_{k=1}^{s}[(s-k)N-(k-1)]\left(R^{sN-k+1}-R^{sN-k}\right)+(s-1)(N-1)(R^{s(N-1)}-R^{s(N-1)-1}) \\ &+[(s-1)(N-1)-2]R^{s(N-1)-1}-(N+1)\sum_{k=2}^{s-1}R^{s(N-1)-k}+\sum_{n=1}^{N-2}\left[(s-1)NR^{sn}-(N+1)(N+1)\sum_{k=1}^{s-1}R^{sn-k}\right].\end{aligned}$$

We can then derive the general expression of Δ as a function of all differences $(R^{si-k+1}-R^{si-k})$:

$$\Delta=\sum_{i=1}^{N}\sum_{k=1}^{s}\underbrace{[(s-k)i-(N-i+1)(k-1)]}_{\beta_{i,k}}\left(R^{si-k+1}-R^{si-k}\right)$$

We show that for any $l\in[1,s]$ and $j\in[1,N]$, the sum of coefficients in front of all terms such that $k>l$ and $i\geq j$ is larger than the coefficient in front of the term such that $k=l$ and $i=j$.

$$\sum_{i=j+1}^{N}\sum_{k=1}^{s}\beta_{i,k}+\sum_{k=1}^{l-1}\beta_{j,k}\geq-\beta_{j,l}. \tag{22}$$

For a weakly convex revenue function, condition (22) is sufficient to ensure that $\Delta\geq 0$, that is, the manufacturer earns more when facing large retailers than when facing small retailers. Condition (22) boils down to:

$$\underbrace{\sum_{i=j+1}^{N}\sum_{k=1}^{s}\beta_{i,k}}_{(i)}+\underbrace{\sum_{k=1}^{l}\beta_{j,k}}_{(ii)}\geq 0. \tag{23}$$

(i) can be simplified as:

$$\begin{aligned}\sum_{i=j+1}^{N}\sum_{k=1}^{s}\beta_{i,k} &= \sum_{i=j+1}^{N}\sum_{k=1}^{s}[(s-k)i-(N-i+1)(k-1)] = \sum_{i=j+1}^{N}\sum_{k=1}^{s}[(s-1)i-(N+1)(k-1)] \\ &= \sum_{i=j+1}^{N}\left[s(s-1)i-(N+1)\left(\frac{s(s+1)}{2}-s\right)\right] = \sum_{i=j+1}^{N}\frac{s(s-1)}{2}(2i-(N+1)) \\ &= \frac{s(s-1)}{2}j(N-j).\end{aligned}$$

(ii) can be simplified as:

$$\sum_{k=1}^{l}\beta_{j,k} = \sum_{k=1}^{l}[(s-k)j-(N-j+1)(k-1)] = l\left((s-1)j-\frac{(l-1)(N+1)}{2}\right).$$

For all $l \in [1,s]$ and $j \in [1,N]$, condition (23) is satisfied.[31]

We now consider the general profit functions, taking into account that the first negotiations may not succeed. We have shown that whenever Φ^i is weakly convex:

$$\Delta = (sN+1)\sum_{i=1}^{N}\Phi^{si}-(N+1)\sum_{i=1}^{sN}\Phi^{i} > 0 \tag{24}$$

Let us now define the function Φ^i as follows:

$$\begin{aligned}\Phi^i &= R^i \text{ if } i \in [\hat{m}, sN] \\ &= i\upsilon^{-} \text{ otherwise.}\end{aligned}$$

The function Φ^i is weakly convex: it is strictly convex over the interval $[\hat{m}, sN]$ and linear over the interval $[1, \hat{m}-1]$. Retail concentration also increases the manufacturer's profit when $\hat{m} > 1$.

[31] The obvious exception is the case in which $l = 1$ and $j = N$: $\beta_{N,1}$ corresponds to the coefficient of the highest term, $R^{sN} - R^{sN-1}$, and therefore condition (22) makes no sense in this case.

D Proof of Section 6.1

D.1 Proof of lemma 4

We know by definition that:

$$\begin{aligned}
\Pi_2(n_1,n_2^S,n_2^F) &= n_2^S T_2^S(n_1,n_2^S,n_2^F) + n_2^F T_2^F(n_1,n_2^S,n_2^F), & (25)\\
\pi_2^S(n_1,n_2^S,n_2^F) &= \frac{R^{n_1+n_2^F}}{n_1+n_2^F} - T_2^S(n_1,n_2^S,n_2^F), & (26)\\
\pi_2^F(n_1,n_2^S,n_2^F) &= \frac{R^{n_1+n_2^F}}{n_1+n_2^F} - T_2^F(n_1,n_2^S,n_2^F). & (27)
\end{aligned}$$

For all relevant values of n_1, n_2^S and n_2^F, we then want to solve the following system of equations:

$$\begin{aligned}
\pi_2^S(n_1,n_2^S,n_2^F) &= \Pi_2(n_1,n_2^S,n_2^F) - \Pi_2(n_1,n_2^S-1,n_2^F), & (28)\\
\pi_2^F(n_1,n_2^S,n_2^F) &= \Pi_2(n_1,n_2^S,n_2^F) - \Pi_2(n_1,n_2^S,n_2^F-1). & (29)
\end{aligned}$$

From this we obtain for any vector (n_1,n_2^S,n_2^F) the tariffs $T_2^S(n_1,n_2^S,n_2^F)$ and $T_2^F(n_1,n_2^S,n_2^F)$ paid by the two types of firms, as well as the manufacturer's profit $\Pi_2(n_1,n_2^S,n_2^F)$.

We now solve the bargaining program in $t=2$ when $N \geq 2$ in two polar cases: first $n_1 = 1$ and second $n_1 = N-1$.

Case in which $n = 1$ Let us show by recurrence that the profit of the manufacturer in $t=2$ when $n_2^S = 1$ retailer succeeded and n_2^F retailers failed in $t=1$ is :

$$\Pi_2(1,1,n_2^F) = \frac{1}{(n_2^F+1)(n_2^F+2)} \sum_{i=1}^{n_2^F+1} \left[(n_2^F+2)(i-1)+i\right] \frac{R^i}{i}. \quad (30)$$

We also show that the tariff paid in $t=2$ by the retailer with which the negotiation succeeded in $t=1$ is then:

$$T_2^S(1,1,n_2^F) = \frac{R^{n_2^F+1}}{n_2^F+2} - \frac{1}{(n_2^F+1)(n_2^F+2)} \sum_{i=1}^{n_2^F} R^i \quad (31)$$

We first show that this is true for $n_2^F = 1$:

- If $(n_1, n_2^S, n_2^F) = (1,0,1)$, the bargaining program is given by:

$$\frac{R^2}{2} - T_2^F(1,0,1) = T_2^F(1,0,1) \Leftrightarrow T_2^F(1,0,1) = \Pi_2(1,0,1) = \frac{R^2}{4}.$$

- If $(n_1, n_2^S, n_2^F) = (1,1,0)$, the bargaining program is given by:

$$R^1 - T_2^S(1,1,0) = T_2^S(1,1,0) \Leftrightarrow T_2^S(1,1,0) = \Pi_2(1,1,0) = \frac{R^1}{2}.$$

- If $(n_1, n_2^S, n_2^F) = (1,1,1)$, the bargaining program is thus given by the following equations:

$$\begin{aligned} \frac{R^2}{2} - T_2^S(1,1,1) &= T_2^S(1,1,1) + T_2^F(1,1,1) - \Pi_2(1,0,1), \\ \frac{R^2}{2} - T_2^F(1,1,1) &= T_2^S(1,1,1) + T_2^F(1,1,1) - \Pi_2(1,1,0). \end{aligned}$$

  We then obtain:

$$\begin{aligned} T_2^S(1,1,1) &= \frac{1}{2\times 3}\left(2R^2 - R^1\right), \qquad T_2^F(1,1,1) = \frac{1}{2}\left(\frac{R^2}{2\times 3} + \frac{2R^1}{3\times 1}\right), \\ \Pi_2(1,1,1) &= \frac{1}{2\times 3}\left(R^1 + 5\frac{R^2}{2}\right). \end{aligned}$$

Therefore, equations (30) and (31) are satisfied for $n_2^F = 1$.
Assume now that the above expressions are true for a given value of $n_2^F \geq 1$. We show that they are then true for $(n_2^F + 1)$. The bargaining program is given by the following equations:

$$\begin{aligned} \frac{R^{n_2^F+2}}{n_2^F+2} - T_2^S(1,1,n_2^F+1) &= T_2^S(1,1,n_2^F+1) + (n_2^F+1)T_2^F(1,1,n_2^F+1) - \Pi_2(1,0,n_2^F+1), \\ \frac{R^{n_2^F+2}}{n_2^F+2} - T_2^F(1,1,n_2^F+1) &= T_2^S(1,1,n_2^F+1) + (n_2^F+1)T_2^F(1,1,n_2^F+1) - \Pi_2(1,1,n_2^F), \end{aligned}$$

Summing these two equations, we obtain:

$$T_2^F(1,1,n_2^F+1) = \frac{1}{n_2^F+3}\left(\frac{R^{n_2^F+2}}{n_2^F+2}+2\Pi_2(1,1,n_2^F)-\Pi_2(1,0,n_2^F+1)\right), \quad (32)$$

$$T_2^S(1,1,n_2^F+1) = \frac{1}{n_2^F+3}\left(\frac{R^{n_2^F+2}}{n_2^F+2}+(n_2^F+2)\Pi_2(1,0,n_2^F+1)-(n_2^F+1)\Pi_2(1,1,n_2^F)\right) \quad (33)$$

In order to determine this expression, we need an expression of $\Pi_2(1,0,n_2^F)$, that is the profit of the manufacturer when it deals with n_2^F firms with which the negotiation had failed in period $t=1$. Let us show, by recurrence, that it is equal to

$$\Pi_2(1,0,n_2^F) = \frac{1}{n_2^F+1}\sum_{i=2}^{n_2^F+1}\frac{(i-1)R^i}{i}. \quad (34)$$

- We have already shown that $\Pi_2(1,0,1) = \frac{R^2}{4} = \frac{(2-1)}{2}\frac{R^2}{2}$, and therefore (34) is true for $n_2^F = 1$.
- Assume now that (34) is true for n_2^F-1 retailers, that is, $\Pi_2(1,0,n_2^F-1) = \frac{1}{n_2^F}\sum_{i=2}^{n_2^F}\frac{(i-1)R^i}{i}$. The negotiation with n_2^F retailers is:

$$\frac{R^{n_2^F+1}}{n_2^F+1} - T_2(1,0,n_2^F) = n_2^F T_2(1,0,n_2^F) - \frac{1}{n_2^F}\sum_{i=2}^{n_2^F}\frac{(i-1)R^i}{i}$$
$$\Leftrightarrow (n_2^F+1)T_2(1,0,n_2^F) = \frac{R^{n_2^F+1}}{n_2^F+1} + \frac{1}{n_2^F}\sum_{i=2}^{n_2^F}\frac{(i-1)R^i}{i}.$$

  Therefore, the profit of the manufacturer is:

$$\Pi_2(1,0,n_2^F) = n_2^F T_2(1,0,n_2^F) = \frac{n_2^F}{n_2^F+1}\left(\frac{R^{n_2^F+1}}{n_2^F+1} + \frac{1}{n_2^F}\sum_{i=2}^{n_2^F}\frac{(i-1)R^i}{i}\right) = \frac{1}{n_2^F+1}\sum_{i=2}^{n_2^F+1}\frac{(i-1)R^i}{i}.$$

We have thus shown that equation (34) is true for all values of $n_2^F \le N-n$.

We also need an expression of $\Pi_2(1,1,n_2^F)$, that is the profit of the manufacturer when it deals with 1 retailers with which the negotiation in $t=1$ succeeded and n_2^F firms with which it failed. By assumption in the recurrence, this expression is given by equation (30).

Replacing these two expressions in the system of equations (32) and (33), we obtain:

$$\Pi_2(1,1,n_2^F+1) = \frac{1}{(n_2^F+2)(n_2^F+3)} \sum_{i=1}^{n_2^F+2} \left[(n_2^F+3)(i-1)+i\right] \frac{R^i}{i},$$
$$T_2^S(1,1,n_2^F+1) = \frac{R^{n_2^F+2}}{n_2^F+3} - \frac{1}{(n_2^F+2)(n_2^F+3)} \sum_{i=1}^{n_2^F+1} R^i.$$

Therefore, equations (30) and (31) are true for all $n_2^F \leq N-1$.

In particular, this is true for $n_2^F = N-1$, and we therefore obtain the equilibrium profit in $t=2$ of the manufacturer and the retailer with which the negotiation is successful in $t=1$ when only one negotiation (over N) has succeeded in $t=1$:

$$\begin{aligned}
\Pi_2(1,1,N-1) &= \frac{1}{N(N+1)} \sum_{i=1}^{N} [(N+1)(i-1)+i] \frac{R^i}{i}, \\
\pi_2^S(1,1,N-1) &= \frac{R^N}{N} - \left[\frac{R^N}{N+1} - \frac{1}{(N)(N+1)} \sum_{i=1}^{N-1} R^i\right].
\end{aligned}$$

Gains from trade with and without myopia. Having defined the gains from a n^{th} success in $t=1$ by:

$$\Delta_1^n = \pi_2^S(n,n,N-n) - \pi_2^F(n-1,n-1,N-n+1), \tag{35}$$
$$\Delta_U^n = \Pi_2(n,n,N-n) - \Pi_2(n-1,n-1,N-n+1). \tag{36}$$

It is immediate that $\Delta_U^1 - \Delta_1^1 > 0$, with Δ_1^1 and Δ_U^1 the respective net gains (or losses) of retailer 1 and U in $t = 2$ if their negotiation in $t = 1$ succeeds rather than breaks, which we compute:

$$\begin{aligned}
\Delta_1^1 &= \pi_2^S(1,1,N-1) - \pi_2^F(0,0,N) \\
&= \left[\frac{R^N}{N} - \left(\frac{R^N}{N+1} - \frac{1}{N(N+1)}\sum_{i=1}^{N-1} R^i\right)\right] - \left[\frac{R^N}{N} - \frac{1}{N(N+1)}\sum_{i=1}^{N} R^i)\right], \\
&= \frac{1}{N(N+1)}\left(2\sum_{i}^{N-1} R^i - (N-1)R^N\right) = \frac{1}{N(N+1)}\sum_{i=1}^{N} R^i - \frac{R^N}{N+1} + \frac{1}{N(N+1)}\sum_{i=1}^{N-1} R^i, \\
\Delta_U^1 &= \Pi_2(1,1,N-1) - \Pi_2(0,0,N) \\
&= (\frac{(N^2+N-1)R^N}{N^2(N+1)} + \frac{R^1}{N(N+1)} + \frac{1}{N}\sum_{i=2}^{N-1}\left(\frac{i-1}{i} + \frac{1}{N+1}\right)R^i - \frac{1}{(N+1)}\sum_{i=1}^{N} R^i).
\end{aligned}$$

In what follows, we prove that $\Delta_1^1 < \Delta_U^1$:

$$\begin{aligned}
\Delta_1^1 - \Delta_U^1 &= \frac{1}{N}\sum_{i=1}^{N} R^i - \frac{(2N^2+N-1)R^N}{N^2(N+1)} - \frac{1}{N}\sum_{i=2}^{N-1}\left(\frac{i-1}{i}\right)R^i, \\
&= \frac{1}{N}\sum_{i=2}^{N-1}\left(1 - \left(\frac{i-1}{i}\right)\right)R^i + \frac{((N(N+1) - (2N^2+N-1))R^N}{N^2(N+1)} + \frac{R^1}{N}, \\
&= \frac{1}{N}\left[\sum_{i=1}^{N-1}\frac{R^i}{i} - \frac{(N-1)R^N}{N}\right] < 0.
\end{aligned}$$

If $\Delta_1^1 - \Delta_U^1 < 0$ then, for all N the profit of U in $t = 1$ is lower when the manufacturer succeeds with only one retailer in $t = 1$ is lower when firms are not myopic than when firms are myopic ($\frac{R_1}{2}$). The equilibrium profit of U is its status-quo profit in the negotiation with a second firm in the first period, etc. Therefore the lag accumulates and the equilibrium first period profit of the manufacturer is always lower when firms are not myopic.

D.2 Proof of lemma 5

Let us now show by recurrence that the profit of the manufacturer in $t = 2$ when it $n_2^F = 1$ retailers failed in $t = 1$ and n_2^S retailers succeeded, assuming that $n_1 \in \{n_2^S, \cdots, N-1\}$ negotiations succeeded in $t=1$, is given by:

$$\Pi_2(n_1,n_2^S,1)=\frac{1}{6}\left(n_2^S\frac{R^{n_1}}{n_1}+(2n_2^S+3)\frac{R^{n_1+1}}{n_1+1}\right). \tag{37}$$

We also show that the tariff paid in $t=2$ by the retailer with which the negotiation has failed in $t=1$ is:

$$T_2^F(n,n_2^S,1)=\frac{1}{6}\left(2n_2^S\frac{R^{n_1}}{n_1}+(3-2n_2^S)\frac{R^{n_1+1}}{n_1+1}\right). \tag{38}$$

We first show that it is true for $n_2^S=1$:

- For all $n_1\leq N-1$, if $(n_1,n_2^S,n_2^F)=(n,0,1)$, the bargaining program is given by:

$$\frac{R^{n+1}}{n+1}-T_2^F(n,0,1)=T_2^F(n,0,1)\Leftrightarrow T_2^F(n,0,1)=\Pi_2(n,0,1)=\frac{R^{n+1}}{2(n+1)}.$$

- For all $n_1\leq N-1$ and $n_2^S\leq n$, if $(n_1,n_2^S,n_2^F)=(n,n_2^S,0)$, the profit on each market, $\frac{R^n}{n}$, is equally shared between the manufacturer and the retailer, and therefore $T_2^S(n,n_2^S,0)=\frac{R^n}{2n}$ and $\Pi_2(n,n_2^S,0)=n-2^S\frac{R^n}{2n}$.

- For all $n\leq N-1$, if $(n_1,n_2^S,n_2^F)=(n,1,1)$, the bargaining program is thus given by the following equations:

$$\begin{aligned}\frac{R^{n+1}}{n+1}-T_2^S(n,1,1)&=T_2^S(n,1,1)+T_2^F(n,1,1)-\Pi_2(n,0,1),\\ \frac{R^{n+1}}{n+1}-T_2^F(n,1,1)&=T_2^S(n,1,1)+T_2^S(n,1,1)-\Pi_2(n,1,0).\end{aligned}$$

  We then obtain:

$$T_2^S(n,1,1)=\frac{1}{3}\left(2\frac{R^{n+1}}{n+1}-\frac{1}{2}\frac{R^n}{n}\right),\qquad T_2^F(n,1,1)=\frac{1}{6}\left(\frac{R^{n+1}}{n+1}+2\frac{R^n}{n}\right),$$
$$\Pi_2(n,1,1)=\frac{1}{6}\left(\frac{R^n}{n}+5\frac{R^{n+1}}{n+1}\right)$$

Therefore, equations (37) and (38) are satisfied for $n_2^S=1$.

Asume now that the above expressions are true for a given value of $n_2^S \geq 1$. We show that they are then true for (n_2^S+1). The bargaining program is given by the following equations:

$$\frac{R^{n+1}}{n+1} - T_2^S(n,n_2^S+1,1) = (n_2^S+1)T_2^S(n,n_2^S+1,1) + T_2^F(n,n_2^S+1,1) - \Pi_2(n,n_2^S,1),$$
$$\frac{R^{n+1}}{n+1} - T_2^F(n,n_2^S+1,1) = (n_2^S+1)T_2^S(n,n_2^S+1,1) + T_2^F(n,n_2^S+1,1) - \Pi_2(n,n_2^S+1,0).$$

Summing these two equations, we obtain:

$$T_2^F(n,n_2^S+1,1) = \frac{1}{n_2^S+3}\left(\frac{R^{n+1}}{n+1} + (n_2^S+1)\Pi_2(n,n_2^S,1) - (n_2^S+2)\Pi_2(n,n_2^S+1,0)\right), \tag{39}$$
$$T_2^S(n,n_2^S+1,1) = \frac{1}{n_2^S+3}\left(\frac{R^{n+1}}{n+1} - 2\Pi_2(n,n_2^S,1) + \Pi_2(n,n_2^S+1,0)\right). \tag{40}$$

Replacing the expressions of $\Pi_2(n,n_2^S+1,0)$ and $\Pi_2(n,n_2^S,1)$ given above in these two equations, we obtain:

$$\Pi_2(n,n_2^S+1,1) = \frac{1}{6}\left((n_2^S+1)\frac{R^n}{n} + (2(n_2^S+1)+3)\frac{R^{n+1}}{n+1}\right),$$
$$T_2^F(n,n_2^S+1) = \frac{1}{6}\left[(1-2n_2^S)\frac{R^{n+1}}{n+1} + 2(n_2^S+1)\frac{R^n}{n}\right].$$

Therefore, equations (37) and (38) are true for all $n_2^S \leq n$. In particular, this is true for $n_2^S = n = N-1$, and we therefore obtain the equilibrium profit of the manufacturer and the retailer with which the negotiation fails in $t=2$, when only one negotiation failed in $t=1$:

$$\Pi_2(N-1,N-1,1) = \frac{NR^{N-1} + R^N(2N+1)}{6N},$$
$$T_2^F(N-1,N-1,1) = \frac{4(N-1)R^N - NR^{N-1}}{6N(N-1)}.$$

When negotiating with the last retailer in $t=1$, assuming that all other negotiations have succeeded, the bargaining program is:

$$\frac{R^N}{N} - T_1 + \Delta_1^1 = NT_1 - d_U + \Delta_U^1$$

where Δ_1^1 and Δ_U^1 are defined above by (35). Again, U earns a lower profit (and retailers a larger profit) when firms are not myopic if $\Delta_1^1 - \Delta_U^1 < 0$. In order to show that this is true, we show that $\Delta_U^1 > 0$ and $\Delta_1^1 < 0$:

$$\Delta_1^1 = [(\pi_2(N,N,0) - (\frac{R^N}{N} - T_2^F(N-1,N-1,1))] = \frac{(4-N)R^N + NR^{N-1}}{3N} < 0,$$
$$\Delta_U^1 = [\Pi_2(N,N,0) - \Pi_2(N-1,N-1,1)] = \frac{-NR^{N-1} + R^N(N-1)}{6N} > 0.$$

where $\pi_2(N,N,0) = \frac{R^N}{2N}$ and $\Pi_2(N,N,0) = \frac{R^N}{2}$. With $d_U = \frac{1}{N}\sum_{i=1}^{N-1} R^i$, i.e. the status-quo value in the case with myopia, it is immediate that the first period profit for the manufacturer is lower when firms are forward looking rather than when they are myopic.

E Proof of Section 6.2

E.1 Proof of lemma 6

We denote $T_t^{k,l}$ the tariff in period t when $k \leq 2$ outlets are open in the market considered and $l \leq 2$ outlets are open in the other market. Assume that one negotiation has failed on each market. The outcome of the negotiation with each outlet is:

$$\frac{1}{4} - T_2^{1,1} = T_2^{1,1} \Leftrightarrow T_2^{1,1} = \frac{1}{8} = \Pi^{1,1}.$$

As in the monopoly case, negotiations on the two markets are independent of one another and $T_2^{1,1} = T_2^{1,2}$. Assume now that no negotiation has failed yet on market 1. Status quo profits are $d_U = \frac{1}{8}$ and $d_i = 0$. The outcome of each negotiation is:

$$\frac{1}{9} - T_2^{2,1} = 2T_2^{2,1} - \frac{1}{8} \Leftrightarrow 3T_2^{2,1} = \frac{1}{9} + \frac{1}{8} \Leftrightarrow T_2^{2,1} = \frac{17}{216}.$$

the profit of U in each market is thus $\frac{17}{108}$. As before, we have $T_2^{2,2} = T_2^{2,1}$. Despite the fact that the total revenue in the market is lower when two retailers are active than when only one is, the upstream firm prefers to bargain with both retailers, using the status quo it obtains when the market is a monopoly to extract a rent from the second retailer. We thus obtain $\Pi_2^{2,2} = \frac{17}{54}$.

E.2 Proof of lemma 7

Assume first that all negotiations but one have failed. Since status quo profits are $d_U = d_i = 0$, the revenue $1/16$ is equally shared, that is, $T_1^{1,0} = \frac{1}{32}$. Now, if both negotiations on a given market have failed, status-quo profits are $d_U = 1/32$ and $d_i = 0$. The revenue at each retailer is $1/18$. The bargaining program with each retailer is thus:

$$\frac{1}{18} - T_1^{2,0} = 2T_1^{2,0} - \frac{1}{32} \Leftrightarrow T_1^{2,0} = \frac{1}{3}\left(\frac{1}{18} + \frac{1}{32}\right) = \frac{25}{3 \times 288},$$

and the upstream profit is then $\Pi_1^{2,0} = \frac{25}{432}$. If, however, one negotiation has failed in each market then the revenue at each retailer is $1/8$. Status-quo profits are the same as in the previous case, and the bargaining program with each retailer is:

$$\frac{1}{8} - T_1^{1,1} = 2T_1^{1,1} - \frac{1}{32} \Leftrightarrow T_1^{1,1} = \frac{1}{3}\left(\frac{1}{8} + \frac{1}{32}\right) = \frac{5}{96}.$$

The upstream profit is then $\Pi_1^{1,1} = \frac{5}{48}$.

We now consider that only one negotiation has failed. In that case, there is a competitive market and a monopolistic market.

- In the negotiation with each retailer on the competitive market, $d_U = 5/48$, the profit it would earn if there were only one remaining active retailer in each market. The revenue at each retailer is $1/12$. The bargaining program is thus:

$$\frac{1}{12} - T_1^{2,1} = 2T_1^{2,1} + T_1^{1,2} - \frac{5}{48} \Leftrightarrow 3T_1^{2,1} + T_1^{1,2} = \frac{1}{12} + \frac{5}{48} = \frac{3}{16} \tag{41}$$

- In the negotiation with the monopolistic retailer, $d_U = 25/432$, the profit it would earn if there were only two remaining active retailers, both in the same market. The revenue of the retailer is $3/16$. The bargaining program is thus:

$$\frac{3}{16} - T_1^{1,2} = 2T_1^{2,1} + T_1^{1,2} - \frac{25}{432} \Leftrightarrow T_1^{1,2} + T_1^{2,1} = \frac{1}{2}\left(\frac{3}{16} + \frac{25}{432}\right) = \frac{53}{432}. \tag{42}$$

Solving the system of equations (41,42), we obtain that $T_1^{2,1} = \frac{7}{216}$, and $T_1^{1,2} = \frac{13}{144}$. The resulting upstream profit is $\Pi^{2,1} = \Pi^{1,2} = \frac{67}{432}$.

We can now consider the case in which U bargains with all firms. In each negotiation, $d_U = \frac{67}{432}$. The revenue in each retailer is $1/9$. The bargaining program is thus:

$$\frac{1}{9} - T_1^{2,2} = 4T_1^{2,2} - \frac{67}{432} \Leftrightarrow T_1^{2,2} = \frac{1}{5}\left(\frac{1}{9} + \frac{67}{432}\right) = \frac{23}{432},$$

which yields $\Pi_1^{2,2} = \frac{23}{108}$.

F Proof of Proposition 6

Assume that E offers a good of quality $q^+ > q^-$ and has access to n retailers. There exists $\tilde{n} \in \{1, \cdots, N\}$ such that:

$$\frac{R^{\tilde{n}-1}}{\tilde{n}-1} < \frac{\upsilon^-}{2} \leq \frac{R^{\tilde{n}}}{\tilde{n}}.$$

X Consider that E bargains with $\tilde{n} > 1$ retailers. Status-quo profits are given by:

$$d_i = \frac{\upsilon^-}{2} \quad \forall i \in \{1, \cdots, \tilde{n}\}, \qquad\qquad d_E = 0.$$

From equation (5) we derive the result of the negotiation with each of the $\tilde{n}$ retailers:

$$\frac{R^{\tilde{n}}}{\tilde{n}} - \tilde{T}_1^{\tilde{n}} - \frac{\upsilon^-}{2} = \tilde{n}\tilde{T}_1^{\tilde{n}}, \qquad\qquad \tilde{\Pi}_1^{\tilde{n}} = \tilde{n}\tilde{T}_1^{\tilde{n}} = \frac{R^{\tilde{n}}}{\tilde{n}+1} - \frac{\tilde{n}}{\tilde{n}+1}\frac{\upsilon^-}{2}.$$

Assume now that there exists $n \in \{\tilde{n}, \cdots, N\}$ such that when E bargains with n retailers, its profit is:

$$\tilde{\Pi}_1^n = \frac{1}{n+1}\left(\sum_{i=\tilde{n}}^{n} R^i - \frac{n(n+1) - \tilde{n}(\tilde{n}-1)}{2}\frac{\upsilon^-}{2}\right).$$

Then, in the negotiation with $(n+1)$ retailers, status-quo profits are given by:

$$d_i = \frac{\upsilon^-}{2} \quad \forall i \in \{1, \cdots, \tilde{n}+1\}, \qquad\qquad d_E = \tilde{\Pi}_1^n.$$

The negotiation with each of the $n+1$ retailers gives:

$$\frac{R^{n+1}}{n+1} - \tilde{T}_1^{n+1} - \frac{\upsilon^-}{2} = (n+1)\tilde{T}_1^{n+1} - \tilde{\Pi}_1^n$$

which yields:

$$\tilde{\Pi}_1^{n+1} = (n+1)\tilde{T}_1^{n+1} = \frac{1}{n+2}\left(\sum_{i=\tilde{n}}^{n+1} R^i - \frac{(n+1)(n+2)-\tilde{n}(\tilde{n}-1)}{2}\frac{\upsilon^-}{2}\right).$$

Hence equation (21).

From equations (8) and (21), the difference $\tilde{\Pi}_1^N - \Pi_1^N$ is of the sign of the following expression:

$$\Delta' = \sum_{i=\tilde{n}}^{\hat{n}-1} R^i - \frac{N(N+1)-\tilde{n}(\tilde{n}-1)+2\hat{n}(\hat{n}-1)}{2}\frac{\upsilon^-}{2}$$

In the interval $[\tilde{n}, \hat{n}-1]$, we always have $R^i < i\upsilon^-$, which we replace in Δ':

$$\Delta' < \sum_{i=\tilde{n}}^{\hat{n}-1} i\frac{\upsilon^-}{2} - \frac{N(N+1)-\tilde{n}(\tilde{n}-1)+2\hat{n}(\hat{n}-1)}{2}\frac{\upsilon^-}{2}$$
$$\Delta' < \frac{2\hat{n}(\hat{n}-1)-2\tilde{n}(\tilde{n}-1)-N(N+1)+\tilde{n}(\tilde{n}-1)-2\hat{n}(\hat{n}-1)}{2}\frac{\upsilon^-}{2}$$
$$\Delta' < \frac{-\tilde{n}(\tilde{n}-1)-N(N+1)}{2}\frac{\upsilon^-}{2}$$

This is strictly negative and therefore the profit of E is always lower than that of an incumbent innovator.

The difference between the net gains of launching the new product for E and for an incumbent innovator is simply given by $\tilde{\Pi}_1^N - [\Pi_1^N - \underline{\Pi}]$, which is of the sign of the following expression:

$$\Delta'' = \sum_{i=\tilde{n}}^{\hat{n}-1} R^i + \frac{2N(N+1)+\tilde{n}(\tilde{n}-1)-2\hat{n}(\hat{n}-1)}{2}\frac{\upsilon^-}{2}$$

In the interval $[\tilde{n}, \hat{n}-1]$, we always have $R^i > i\frac{\upsilon^-}{2}$, which we replace in Δ'':

$$\Delta'' > \sum_{i=\tilde{n}}^{\hat{n}-1} i\frac{\upsilon^-}{2} + \frac{2N(N+1) + \tilde{n}(\tilde{n}-1) - 2\hat{n}(\hat{n}-1)}{2}\frac{\upsilon^-}{2}$$
$$\Delta'' > \frac{\hat{n}(\hat{n}-1) - \tilde{n}(\tilde{n}-1) + 2N(N+1) + \tilde{n}(\tilde{n}-1) - 2\hat{n}(\hat{n}-1)}{2}\frac{\upsilon^-}{2}$$
$$\Delta'' > \frac{2N(N+1) - \hat{n}(\hat{n}-1)}{2}\frac{\upsilon^-}{2} > 0$$

This is thus always positive: the net gain of launching a new product is higher for E than for an incumbent innovator.