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Loss-leaders Banning Laws as Vertical Restraints

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Abstract: This paper explores the indirect in‡ationary mechanism allowed by loss leaders banning laws. In a model where a monopolist producer sells his product through vertically separated and di¤erentiated retailers, we show that the ban of resale at a loss can be used strategically by the producer to increase his wholesale price and pay the retailers through negotiated listing fees, thus raising his pro…t. The ban turns wholesale prices into ‡oor prices, thus increasing resale price and lessening consumers' welfare. These results are robust if the listing fees are two-part tari¤.

Résumé: Cet article étudie un e¤et pervers in‡ationniste de l'interdiction de la revente à perte. Dans un modèle où un producteur en monopole vend son produit par l'intermédiaire de distributeurs di¤érenciés, nous montrons que l'interdiction de la revente à perte peut permettre au producteur de limiter la concurrence intra-marque et d'améliorer son pro…t en augmentant son prix de gros, rétribuant les distributeurs par le biais des marges arrière. L'interdiction de la revente à perte transforme le prix de gros en prix-plancher, augmentant le prix de détail et diminuant le surplus des consommateurs.

Jel Codes: L13, L41, L42.

Keywords: Vertical Restraints, Loss Leaders, Retailing Sector, Intrabrand competition.

1 Introduction

Below-cost pricing at the retail level, or "loss-leading", is a pricing strategy used by powerful retailers as part of supermarkets' price war: they make (apparent) losses by selling some products at a price below their cost, to attract consumers in their shops. Yet selling some products at below-cost prices may be damaging to small competitors who can't a¤ord to sell at such low margins, or to small suppliers, and in particular, in the market for fresh products, farmers who have a limited bargaining power and are forced to supply their products at low prices. On the other hand, retailers claim that such a strategy is good for consumers as it reduces prices, at least on some products. The global impact of such a strategy on prices and welfare, as well as its consequences on the share of pro…ts among …rms, are di¢cult to assess.

Retailers may have several di¤erent motivations to choose loss-leading strategies. A large literature in industrial economics has been devoted to analyse below-cost pricing strategies, and points out several explanations relying on horizontal motivations, as such a strategy may directly a¤ect horizontal competition The most classical view is that a below-cost price can be used for predatory purposes, in the …nal market as well as in any intermediate market: in a dynamic setting, a …rm may choose to set her price below her cost, thus realizing losses in a …rst period, to eliminate her rivals and then bene…t from the monopoly pro…t in a second period (see for instance Milgrom and Roberts, 1982, or Telser, 1966). Moreover, loss-leading may also simply result from optimal pricing by a multi-product retailer, without predatory purposes (see Ramsey, 1927; or Bliss, 1988): if there exists complementarities between products, below-cost pricing on some products may be optimal for a monopolist, in order to increase the demand for complement goods sold with positive margins. A third explanation is that loss-leading with advertisement may be used to attract consumers imperfectly informed about prices and supporting shopping costs, thus increasing the quantities sold and the welfare (Lal and Matutes, 1994; Gerstner and Hess, 1987). Following the same basic idea, Whalsh and Whelan (1999) prove that when retailers are di¤erentiated by their location, and when consumers have information about prices of some of the products but not all, a retailer may attract consumers in her shop by pricing below their cost some products whose prices are known by consumers, and then set the monopoly price for some other goods. In such a case, below-cost pricing may compensate consumers for their imperfect information, and may improve consumers' surplus. Finally, the horizontal analysis of below-cost pricing points out

good and bad consequences, and does not conclude simply to assess the practice of loss-leading by retailers, thus it is di¢cult to decide whether it should be allowed or not. However, below-cost pricing on the …nal market may also have vertical motivations that have received rather little attention in the economic literature[1]. Here we try to provide a vertical analysis of below-cost pricing by a retailer, i.e. loss leading.

In a context where large retail chains dominate the market and have much bargaining power towards their suppliers, retailer power has become an important issue for many governments (see for instance the British O¢ce of Fair Trading's investigation in 1999 or the French Conseil de la Concurrence report in 1997). Overall increasing retailer concentration as well as the development of own brand products[2] have brought increased market- and buying power that often led to con‡icts between the various actors in the system, mostly producers, retailers and consumers (see Clarke et al., 2002). Public policies aim at resolving such con‡icts, and controlling vertical contracts and pricing practices has become a target for competition policy. Within the European Union, Article 86 of the Treaty of Rome prohibits any "abuse of a dominant position", and pricing practices resulting from such an abuse may be condemned as anticompetitive. For instance, in 2000 in Germany, the Cartel O¢ce ordered Wal Mart, Aldi and Lidl to stop selling staples like milk and butter at below-cost prices, as it was hurting competition and could drive some smaller shops out of business. In that case, loss-leading was more or less viewed as a predatory pricing strategy. In the United States, below-cost pricing may also be condemned as an anticompetitive predatory practice (see Bolton et al., 2000): in 1993, Wal Mart was also condemned for having set too low prices on pharmaceutical products in Arkansas. Some countries have gone farther in adopting special laws preventing retailers from selling merchandise below cost, thus setting up per se ban of below-cost pricing for retailers. In particular, below-cost pricing for retailers is prohibited in Belgium, France, Ireland, Portugal and Spain. It is also prohibited for some products such as gasoline in some States in the United States; moreover, in California, below-cost sales are prohibited when the motive of such a pricing is to promote the sales of other merchandise (cf.

[1] The literature on below-cost pricing in an intermediate market is more developed. For instance, Marx and Sha¤er (1999) show that below-cost pricing from one supplier in the intermediate goods market may allow a monopolist buyer negotiating sequentially with two suppliers to extract rent from the second supplier. In that case, welfare may increase or decrease as a result of below-cost pricing. However, this interpretation of below-cost pricing does not apply to loss-leading in the …nal market.

[2] See Berges-Sennou, Bontems and Réquillart (2004).

Eckert and West , 2003). In this paper we focus on per se ban of below-cost pricing for retailers.

Prohibiting below-cost selling for retailers requires to provide a precise legal de…nition of the cost taken into account, that may not necessarily …t the economic de…nition of retailers' cost. In most of the countries where loss-leaders ban exists, the law prevents retailers from setting the price of a good below a threshold de…ned as the net invoice price, excluding all o¤-invoice and anticipated rebates that are not already on the bill at the time of delivery, plus the transport cost. In particular, all slotting fees that are negotiated on an annual basis at the end of the year cannot be integrated in the threshold. Moreover, pure retailing costs are also axcluded: the legal de…nition of the threshold is very di¤erent from the economic de…nition of the average variable cost that would be taken into account to identify a predatory pricing (see Areeda and Turner, 1975). The de…nition of this threshold appears very clearly in the Irish Groceries Order (1987): the threshold is the net invoice price of the good, "such price shall be calculated net of any allowance or refund that is allowable on the return of the goods' container, and no account shall be taken of discounts, rebates or other deductions which are not entered on the invoice in cash terms as deductions from the sum due to the supplier or wholesaler". The French Galland Law[3] and the Spanish 7/1996 law use the same de…nition of the threshold. Figure 1 gives a more precise view of what can be considered as the "unit price" threshold, p being the unit price paid by the consumer, and pp the "long term" unit price paid by the retailer to the producer, for instance at the end of the year. All rebates that are already deduced on the invoice are included in the threshold, but the conditional rebates that are not already deduced on the invoice are not included in the threshold, even if their conditional amount is known (for instance, if they are published in the general terms of sales) and if they are anticipated by the retailer. Furthermore, the far-left column represents all the fees that are secretly negotiated between the producer and each retailer, and that do not appear on the public general terms of sales (GTS): some of these rebates can even be invoiced as "commercial services" from the retailer to the producer. A fortiori, these rebates cannot be integrated in the threshold.

[3] Below-cost pricing by retailers was already banned in France before the Galland Law, but the threshold was not clearly de…ned. The Galland Law, implemented in 1997; provides a very accurate de…nition of the threshold which excludes all the anticipated rebates and reductions.

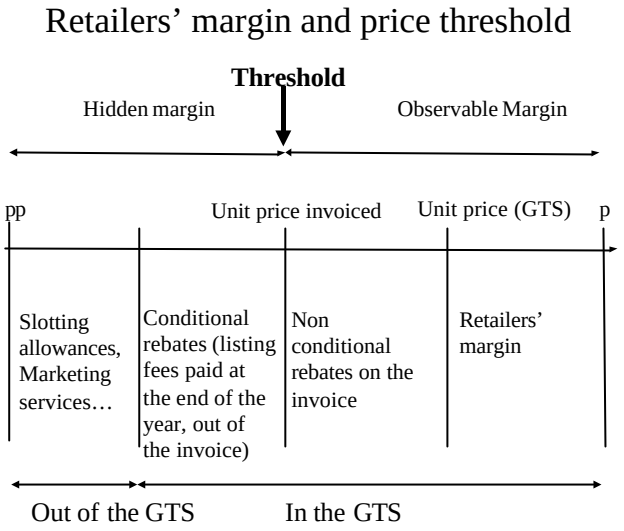

Figure 1: retailers' margin and price threshold

This …gure shows that, in reality, the ban of below-cost pricing for retailers, or loss-leading, prohibits retailers to sell the goods under a threshold that can be significantly higher than their "per period" average variable cost (pp on the …gure). The mechanism we highlight in this paper relies on this di¤erence which ensues from the formulation of the laws. Furthermore, retail legislation requires in these countries that producers publish general terms of sales including a price schedule, and, according to the European as well as North-American competition laws, the general terms of sales have to be non-discriminatory. But most of the "hidden margins" are determined by bilateral and secret negotiations, thus leading to a possible discriminatory treatment of customers.

The rebates we call "hidden margins" are very important indeed, and table 1 summarizes some French data on how supermarkets' margins are split up between observable and hidden margins in 1995 and 1999 (as a percentage of total margin): on average, for most products, hidden margins are the largest part of supermarkets margins, and in fact they express the bargaining power of large retail chains. Negative …gures in the observable margin column indicate that these items were loss-leaders sold at below-cost prices.

Product category	Observable / Hidden margin	
	1995	1999
Grocery	26/74	12/88
Fresh and dairy products, frozen items	50/50	34/66
Cosmetics, detergents	-6/106	14/86
Drinks	-1/101	11/89
Other non-food	61/39	56/44

Table 1. Source: ILEC (association of French Producers).

To progress in ascertaining the impact of the below-cost legislation, it seems interesting to answer the following question: could a ban of loss-leaders have adverse e¤ects in itself? The question we address in this paper is the e¤ect of such a ban on prices. Of course, the law has an obvious direct e¤ect: it forces the retailers to increase the prices of the goods that were previously sold at below-cost prices. So the price of former loss-leaders naturally increases at the time the law is enforced. But this e¤ect is limited to the prices of loss-leaders, and it can be compensated by a decrease in the prices of other items if the multiproduct retailer follows an optimal pricing strategy (Chambolle, 2004). Finally, the e¤ect of the ban on prices, on average, is ambiguous and it is di¢cult to conclude about the global impact of the law on average prices, as we lack theoretical basis. Some empirical evidence is o¤ered in the Irish case by Collins et al. (2001); who examine the impact of the ban on below-cost selling of some products since 1988 and show that the law had a signi…cant positive in‡uence on retail gross margins on a basket of grocery products. In the French case, several empirical studies gave di¤erent conclusions. A …rst statistical measure was led by the panellist Nielsen. It launched the debate by showing an average increase of 4.14% of the prices of 1500 items, all national brands, in two months after the application of the law. But a counter-test led by the Ministry of Economics concluded that, during the same period, the increase was only 0:5%; on average: however, this study took into account not only national brand items, but also private labels and discount brands for each product.

In this paper, we focus on a potentially in‡ationary mechanism of the ban. Our intuition is that the ban of below-cost pricing for retailers could allow a producer to impose ‡oor pricing constraints that could be used strategically as a price-increasing vertical restraint. Thus we focus on a vertical e¤ect of the ban that has not yet been

studied in the literature. We present and solve the model in section 2. Section 3 proposes some extension to the cases where (1) listing fees are two-part tari¤s and (2) bargaining issues are observable ex post. Section 4 concludes.

2 The model

Consider a market for a homogeneous good produced by a monopolist P. The producer cannot sell directly to the consumers and has to sell the good through a downstream independent retail industry, where two di¤erentiated retailers 1 and 2 are competing in prices[4]. We assume that the retailers do not transform the good and that they resell each unit with zero retailing cost. We also normalise producing costs to zero without loss of generality. We denote q_i the quantity and p_i the price of the good sold by retailer i ($fi; ¡ ig = f1; 2g$) on the …nal market. We assume that the inverse demand of the consumers for the good at i's shop is as follows:

$$p_i = 1 ¡ q_i ¡ bq_{¡ i} \tag{1}$$

Parameter b ($b \in [0; 1]$) measures the degree of substitutability of the retailers: even if the good is homogeneous, customers di¤er in their store preferences and b represents the intrabrand competition when the two retailers o¤er the same product.

An important feature of this model is that vertical contracting between the producer and his retailers is modelled following the real timing of vertical negotiations. In most countries, commercial laws require general terms of sale to be public and non-discriminatory, but the negotiations over listing fees and commercial services are secret. We thus assume that the producer has to publish his (unit) wholesale price w before any negotiation with his retailers: contrary to the classical literature on producer-retailers relationships (see Dobson and Waterson (1997), for instance), we divide the contracting stage into two stages. This wholesale price is the same for both retailers 1 and 2: Once the wholesale price is published, the two retailers secretly and simultaneously[5] bargain with the supplier over rebates, which we call generically "listing fees" or "slotting fees", transferred from the producer to each retailer. We assume that these fees are bilaterally negotiated following a Nash bargaining process, which seems consistent with the reality of vertical negotiations (see Bloom et al.,

[4] For a presentation of the classical literature on intrabrand competition, see Motta (2004).

[5] For a study of the impact of the sequentiality of negotiation on the …rms' bargaining power, see Chen (2002).

2000, or Allain and Chambolle, 2003). The producer has an exogenous bargaining power denoted ® (® 2 [0; 1]); the retailers both have the same bargaining power 1 ¡ ®. These rebates are assumed to be proportional to the quantities exchanged (we test the robustness of our results to this assumption in section 3:1 where we assume that they are two-part tari¤s), and paid after some delay, for instance at the end of the year: under a ban of loss-leaders as the Galland law for instance, it implies that these fees cannot be deduced from the reference price which excludes all the anticipated rebates and reductions that are not already on the bill at the time of delivery. Under the ban, the retailers thus cannot sell the good at a price below the threshold w: In the last stage, wholesale prices and listing fees are common knowledge, and retailers compete on the product market. The timing of the game is as follows:

Stage 1: The producer sets his wholesale unit price w:

Stage 2: Unit rebates f_i ; i 2 f1; 2g are secretly and bilaterally negotiated.

Stage 3: Retailers compete in prices.

Let us depict the bargaining process more precisely. We follow Horn and Wolinsky (1988) by assuming that the …rms have "passive beliefs". If retailer i does not come to an agreement with the supplier, it does not a¤ect the issue of the other pair's negotiation: the disagreement point corresponds to a situation where the other pair operates at the anticipated equilibrium level. This assumption is common in literature on secret multilateral negotiations[6]. It is quite intuitive that the retailers negotiate competitively and thus each one do not know the outcome of the other pair's negotiation at the time of bargaining. It could seem more surprising that this assumption also applies to the producer, but it simply means that the producing …rm sends two commercial agents to negotiate on the same day with di¤erent retailers, and that each of them ignores the outcome of the other's negotiation: this is not an unrealistic assumption. Furthermore, in the basic model we assume that the issue of a negotiation in stage 2 is non observable ex-post by the retailers, so that the …rms do not adapt their strategies in the last stage: none of them knows whether the negotiation between the supplier and the competitor succeeded or not, and each of them believes that the other pair's negotiation led to the equilibrium outcome. However we show in section 3:2 that our results are robust to changes in this assumption about observability.

We solve the game for its symmetric subgame-perfect Nash equilibria, comparing

[6] For a detailed presentation of di¤erent sets of beliefs and among others the passive beliefs, see McAfee and Schwartz (1994; 2004) and Marx and Sha¤er (2004).

the outcomes of the game with legal constraint (ban of below-cost pricing) to those in the benchmark case (without the ban).

2.1 Equilibrium in the game with no legal restriction

The last stage of the game determines the optimal retail prices as a function of the wholesale price w; and of the two values of the listing fees f_i; $i \in \{1;2\}$ (see appendix 5:1):

$$p_i = \frac{2(1 + w + f_i) + b(w + f_{-i}) + b + b^2}{4 + b^2} \tag{2}$$

Anticipating these downstream prices, the resolution of the second-stage Nash program gives the optimal values of the listing fees. Interestingly, the anticipated profit of the producer at the first stage does not depend on the wholesale price: there is a continuum of solution pairs $(w^*; f_i^*)$ for $i \in \{1;2\}$; satisfying the Nash conditions. All the solutions lead to the same net transfer $w^* + f_i^*$ from retailer i to the producer. The equilibrium net unit price $w^* + f_i^*$ paid by retailer i to the producer is strictly increasing in the producer's bargaining power θ:

$$(w + f_i)^* = \frac{\theta(2 + b + b^2)}{2(2 + b^2 + b\theta)} \tag{3}$$

In fact, there is no commitment value of the first stage of the game, as the outcome of the game is completely determined at the second stage by the negotiation of the listing fees. Equilibrium downstream prices are then positive and smaller than 1 :

$$p_i^* = p^* = 1 - \frac{(2 + b^2)(2 + \theta) + b\theta}{2(2 + b)(2 + b^2 + b\theta)} \text{ for } i \in \{1;2\} \tag{4}$$

Depending on the value of f_i^*; p^* may be higher or lower than the wholesale price w^*: this equilibrium may be with or without below-cost pricing. Furthermore, the higher $w^* + f_i^*$ is, the higher the final price p^* is, according to the double-marginalization effect. Thus, the final price is also a strictly increasing function of the producer's bargaining power θ: Moreover, final prices and retailers' profit are decreasing in b, the intensity of competition between the retailers. Interestingly, the net unit price $w^* + f_i^*$ paid by retailer i to the producer as well as the profit of the producer also decrease in b : by lowering final prices, retailers' competition reduces the "pie" of total profits and even the producer's margin and profit.

2.2 Forbidding loss-leading

Let us now consider the case where below-cost pricing is prohibited. The pricing strategies of the retailers are then constrained: they have to set retail prices above the wholesale price. We look for situations where the producer uses the ban to constrain his retailers' pricing strategy. In that case, if the constraint is really binding, the producer anticipates that the two retailers will have to set zero margins and that retail prices will be $p_1 = p_2 = w$: He thus sets at the first stage the wholesale price w in order to maximise the total profit he will have to share with his retailers at the second stage: $w^{\circ} = \pi_1^{\circ} = \pi_2^{\circ} = \frac{1}{2}$:

This partial result is quite intuitive, as if the contraint is binding, then each retailer sets her retail prices equal to the wholesale price, and gets profit only through the listing fee. The producer behaves then as a vertically integrated firm. We denote this strategy as "floor pricing" strategy. We now have to determine in which cases the constraint is really binding, i.e. when the retailers' interest is indeed to set zero margins. In such cases we will say that the strategy "exists" and this will happen when the optimal price chosen by the producer, $w^{\circ} = 1=2$; is on the decreasing side of the retailer's profit function (w°, p^{α}). Afterwards, we will check that, when the strategy exists, the producer finds it profitable to choose it rather than another non-binding wholesale price leading to the downstream prices p^{α}.

Lemma 1 *The constrained equilibrium candidate exists only if the producer has little bargaining power.*

Proof : see appendix 5.2. ■

For small values of β; the optimal constrained wholesale price is higher than the optimal non constrained retail price, so that the constraint is really binding. This lemma is quite intuitive since on the one hand the optimal constrained wholesale price is independent of β, while on the other hand the optimal final price in the unconstrained case is an increasing function of the producer's bargaining power: the unit net margin of the producer, $w^{\alpha} - f_i^{\alpha}$; increases with β. Yet this increase is partially passed on to the consumers by the retailers who set higher resale prices, increasing their margins to the detriment of the total profit of the industry. This is a classical double-marginalization effect.

More precisely, the constraint is binding for the retailers if and only if the producer's bargaining power is less than a threshold: $\beta \cdot \overline{\beta_e} = \frac{b(2-b^2)}{2-b}$. The threshold

$\overline{\alpha_e}$ is always in the interval $[0;1]$. Furthermore, $\overline{\alpha_e}$ is increasing in b; $\overline{\alpha_e} = 0$ for $b = 0$ and $\overline{\alpha_e} = 1$ for $b = 1$: the ‡oor pricing strategy exists for larger values of the producer's bargaining power when retailers' competition is …ercer. The intuition behind this result is as follows. On the one hand, in the unconstrained case, for a given α; the …ercer the competition between retailers is, the lower is the …nal price p^{α}. On the other hand, in the constrained case, the level of the unit price de…ned in the general terms of sales of the producer is independent of b as the stratecig use of the law eliminates downstream competition. Thus naturally, the condition on α for the constrained equilibrium to exist is less binding as the competition is …ercer (as b increases).

To know whether this candidate is indeed an equilibrium, it has to be pro…table for the producer to choose the associate value of the wholesale price at the …rst stage of the game. We study the pro…tability of the strategy in appendix.

Lemma 2 The ‡oor pricing strategy is always pro…table for the producer when it exists.

Proof : see appendix 5:2. ■

The producer always bene…ts from this strategy. In fact, as we mentioned, this ‡oor pricing strategy allows the producer to maximise the joint pro…ts of the vertical structure, but it also has an impact on the sharing of the pro…t among the …rms. Considering b as given, the share of the pro…t captured by the producer $\frac{\pi_P}{\pi_P + 2\pi_D}$ naturally increases in α: Yet in the unconstrained case (1), because the producer negotiates the fees f_i in order to maximize his own pro…t, there is a double-marginalization externality also increasing in α: Thus the bargaining a¤ects both the sharing of the pro…t and the total joint pro…ts. More precisely, the producer's pro…t share in the unconstrained case is $\frac{\pi^{\alpha}_P}{\pi^{\alpha}_P + \pi^{\alpha}_1 + \pi^{\alpha}_2} = \frac{(2-b)(2+b)\alpha}{(2(2+\alpha)-b(2b+\alpha))}$: In the constrained case (2), as the bargaining only determines the sharing of pro…ts, the producer's pro…t share is $\frac{\alpha\Phi}{\alpha\Phi + f_1 + f_2} = \alpha$: Figure 2 shows the evolution of the producer's pro…t share in both cases for a given value of the parameter b.

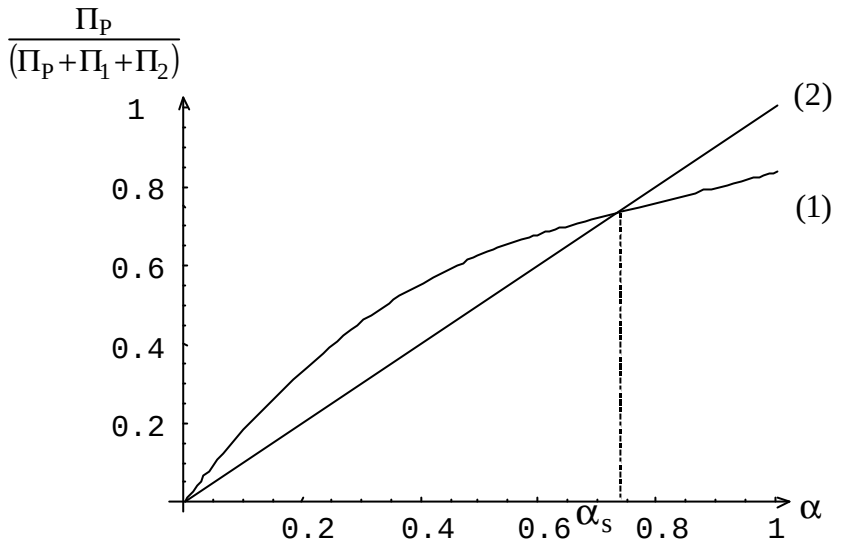

Figure 2: Producer's share of total pro…t

A new threshold $®_s = \frac{b^2}{2\,¡\,b}$ appears (notice that $®_s < \overline{®_e}$). If ® 2 [0; $®_s$], the ‡oor pricing strategy reduces (resp. raises) the share of total pro…ts the producer (resp. a retailer) captures, while if ® 2 [$®_s$; 1] the ‡oor price strategy raises (resp. reduces) the share of total pro…ts the producer (resp. a retailer) captures. This result comes directly from the double-marginalization e¤ect in the unconstrained equilibrium, which is suppressed in the constrained case as retailers set then zero margins. In the unconstrained case, when ® is close to zero, a rise in the producer's bargaining power …rst bene…ts in a greater extent to the total joint pro…t as it allows a relaxation of the downstream retailing competition[7]. Thus the producer is able to capture a share of total pro…t that is larger than ®: But, for higher values of ®, a rise in the producer's bargaining power leads to a stronger double-marginalization e¤ect that gradually becomes harmful for total joint pro…ts. Anticipating this negative e¤ect, the producer limits the exercice of his negotiation power and thus captures a share of total pro…t

[7] This e¤ect is also pointed out in the extension with two-part tari¤ hidden margin, since as two-part tari¤ usually allows to eliminate entirely double-marginalization e¤ect, we show here a small but positive e¤ect of double-marginalization, which may be sometimes pro…table for the whole vertical structure. For another example of positive e¤ects of double-marginalization, in another framework, see for instance Bonanno and Vickers (1988).

smaller than ®: However, the ‡oor pricing strategy is always pro…table for the producer: when ® 2 [0; $\®_s$] ; the positive e¤ect of this strategy on the total joint pro…ts always prevails over the negative e¤ect on producer's pro…t share. If we now compare retailers' pro…ts in both cases, we show that there exists another threshold $\overline{\®_r}$ (with $\®_s < \overline{\®_r} < \overline{\®_e}$) such that the ‡oor pricing strategy is pro…table for retailers only if producer's bargaining power is not too strong: $\® < \overline{\®_r}$: Thus, even if the producer uses this strategy to relax downstream competition, this strategy may be harmful for retailers when the double-marginalization e¤ect becomes too high.

Proposition 3 *When the producer has little bargaining power, he is able to use strategically the the ban of loss-leaders to impose a ‡oor-price in equilibrium. When the producer has a large bargaining power, the equilibrium is the same with or without the ban.*

Proof : see appendix 5:2. ■

More precisely, the ‡oor pricing strategy is chosen by the producer in equilibrium for $\® \cdot \overline{\®_e} = \frac{b(2-b^2)}{2-b}$: In that case, each retailer i negotiates a share $\frac{1-\®}{2}$ of the vertically integrated structure's pro…t, and sets a zero margin at the third stage: $p_e = w_e = 1=2$: The …nal price is then higher than in the benchmark equilibrium, without the legal constraint.

Proposition 4 *The ban of loss-leaders leads to higher prices for small values of the producer's bargaining power.*

Proof : see appendix 5:2. ■

An interesting and paradoxical e¤ect of this strategy is that, although suppressing double-marginalization, it increases …nal prices: this ensues from the negotiation of the rebates at the second stage. The ban of below-cost pricing can be used as a mean to increase the total pro…ts of the industry to the detriment of the consumers, even in situations where there would not necessarily be loss-leaders in equilibrium without the ban: as we have seen in section 2.1, in the absence of below-cost legislation, the …nal price in equilibrium would be the same with or without below-cost pricing. The ban in itself allows the producer to set a ‡oor price[8], thus reducing retailers' competition as would a vertical restraint like resale price maintenance.

[8] This e¤ect is robust to the introduction of substitute products by the same producer (see Allain and Chambolle, 2004).

3 Robustness and extensions

3.1 Two-part listing fees

In this section, listing fees are assumed to be two-part tari¤s: the marginal component is denoted f_i^0 and the …xed fee F_i^0. Just as with linear tari¤s, there is no commitment value for the wholesale price at the …rst stage of the game since the outcome is completely determined at the second stage by the bargaining over the listing fees. As in section 2, the equilibrium of the game is de…ned by the "real" unit price paid by the retailer to the producer, that is the di¤erence $w^0 ¡ f_i^0$. The equilibrium does not depend on the repartition between the input price w^0 in the general terms of sales and the unit price paid through hidden margins f_i^0: The …xed part F_i^0 determines the sharing of the vertical structure's pro…t, thus the level of f_i^0 simply maximizes the vertically integrated structure's pro…t. In equilibrium, f_i^0 would be zero if competition between retailers were perfect and positive as long as $b \in]0;1]$: Indeed, when retailers buy the goods at a strictly positive unit cost, the …nal prices they set are higher than if this buying unit price were null: a high value of $w^0 ¡ f_i^0$ reduces downstream competition between retailers and thus increases the total joint pro…ts[9].

Proposition 5 .The ‡oor pricing equilibrium candidate always exists and this strategy is always pro…table for the producer.

Proof : see appendix 5.3. ■.

The existence of the constrained equilibrium candidate is now independent of the producer's bargaining power. In fact, when hidden margins are two-part tari¤s, the producer's negotiation power θ has no in‡uence on the level of $w^0 ¡ f_i^0$: As we mentioned, with the …xed part F_i^0, the producer captures a part θ of the joint pro…ts, the level of f_i^0 simply maximizes the vertically integrated structure's pro…t which is independent of θ. Thus, whatever the producer's bargaining power, the …nal price and thus the sum of all pro…ts remains the same.

Moreover, in the linear pricing game, the constrained equilibrium candidate does not always exist since the double-marginalization e¤ect raises the …nal price $p^¤$ while the constrained price is a constant $\frac{1}{2}$: On the contrary, in the two-part tari¤ case, even if double-marginalization is not entirely eliminated, it is considerably reduced, and p^0 is thus much lower while the constrained price is unchanged. Here, with or without

[9] This result was highlighted by Sha¤er (1991).

the ban of below-cost pricing, the sharing of joint pro…ts is unchanged: the producer captures a part ®: However, the total pro…t is always increased in the constrained case, that's why the producer always bene…ts from this strategy. Our results are thus robust to a two-part tari¤ hidden margin speci…cation. However, one result changes in the two-part tari¤ case: here, retailers always bene…t from this producer's strategy.

3.2 Bargaining assumptions

In this subsection, we assume that …rms bargain bilaterally and secretly, but if previously one retailer could not observe if the bargaining between the two other parties had been successful or not, she now does. Thus, if the bargaining between retailer i and the supplier fails, retailer ¡i observes this outcome at the beginning of the last stage of the game, and she may thus pro…tably renegotiate with the supplier in the new context where retailer ¡i acts as a downstream monopoly. The disagreement point di¤ers from the one developped in section 2.

Proposition 6 *The constrained equilibrium candidate exists if the producer's bargaining power is not too high. When it exists, this strategy is always pro…table for the producer.*

Proof : see appendix A4. ■.

More precisely, we show that there exists a threshold $\theta_e(b)$, such that the constrained equilibrium exists when $\beta \cdot \theta_e$:

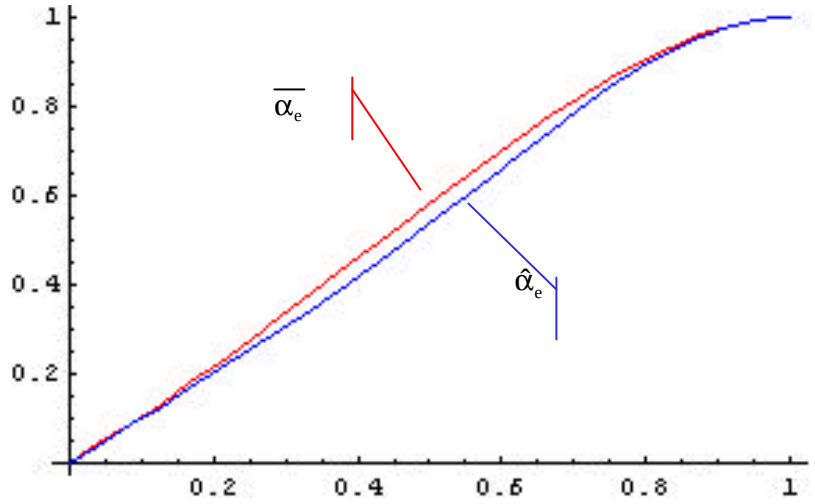

Figure 3 : Comparison of thresholds

In the above …gure, we compare our threshold $\hat{\alpha}_e(b)$ to the threshold $\overline{\alpha_e}(b)$ obtained in section 2. We prove that $\overline{\alpha_e}(b) \geq \hat{\alpha}_e(b)$ whatever the value of the parameter b. In fact, this new assumption on bargaining only reinforces the producer's status-quo, all other things being equal. For a given α, the producer is able to set a higher real unit price $w - f_i$ than in our benchmark case of section 2. Thus double-marginalization is reinforced and the …nal price p is here higher than p^o: Concerning the constrained equilibrium, as double-marginalization disappears, this new speci…cation of bargaining only a¤ects the sharing of pro…ts between the producer and the retailers, but the …nal price is unchanged. Thus, the new threshold for constrained equilibrium existence is lower. However, we have here proved that our results are qualitatively robust to this new speci…cation.

4 Conclusion

In this paper, we address the question of the impact of below-cost pricing legislation on producers and retailers' conduct. We highlight an adverse e¤ect of the ban of below-cost pricing for retailers on prices, and show that the ban can be misused by a supplier as a vertical restraint reducing intra-brand competition, in order to raise his

pro…t to the detriment of consumers, and in some cases to the detriment of retailers. The ban allows a producer to indirectly impose a ‡oor price to his retailers, which paradoxically could constitute in itself a break of the competition laws in Europe as well as in the United States. This adverse e¤ect of below-cost pricing laws has been recently denounced by …rms in some countries like France and Ireland, where national brand suppliers were accused by retailers to raise their prices in the general terms of sale, compensating the retailers through higher hidden margin but limiting their competition strategies. We show that this e¤ect may lead to higher retail prices if the producer's bargaining power is not too high, but also that the intensity of retail competition facilitates the use of this strategy by the supplier. Furthermore, the ban's in‡ationary adverse e¤ect appears even in situations where there would not necessarily be below-cost pricing in equilibrium without the legal constraint: this element clearly supports the use of a rule of reason rather than a per se ban of below-cost pricing by retailers.

Our model proposes an original analysis of contracts between producers and retailers. Although in most countries there are, on one side, general terms of sale imposed by producers, and on the other side, a more or less observable negotiation on commercial services, listing of products, slotting allowances, discounts and rebates, the economic literature has mainly focused on simple linear pricing contracts as well as some simple vertical restraints. Among theses vertical restraints, the most studied in the literature are two-part tari¤s, resale price maintenance, quotas or exclusive territories. Sha¤er (1991) proposed a theoretical analysis of slotting allowances, but his formalization is similar to that of two-part tari¤s. Here we try to approach the real timing of vertical negotiations, and we take into account a bargaining of contracts very closely related to those existing between producers and retailers. Thus we introduce a sequentiality between the setting of general terms of sale by the producers and the negotiation of what we call the "hidden margin". This timing allows a better understanding of producers-retailers relationships.

Of course, the conclusions of this study have been obtained in a simple setting, and have to be balanced against other potential e¤ects of loss-leading. The global e¤ect of the ban of below-cost pricing by retailers should be measured according to several dimensions. A global assessment of the law was beyond the scope of this study, but we provide elements that contribute to the policy debate. Further research on that topic could help public policy makers to be better advised of the consequences of such a legislation. In particular, the in‡uence of the ban on the …rms' behaviour

in a broader context including inter-brands competition seems an interesting …eld for further research. In a joint paper (Allain and Chambolle, 2004), we study the pro-collusive e¤ects of the ban in the case of competing vertical structures. The analysis would also bene…t from the integration of own brand products in the basket of goods, to investigate the cross e¤ects of the producer's decision on the prices and market shares of other products.

5 Appendix

5.1 Equilibria of the game without constraint

We solve the game by backward induction. We look for symmetric equilibria only. Consider the subgame where the listing fees f_i, $(i = f1; 2g)$ and the wholesale price w are …xed. Each retailer i anticipates downstream demands $q_i(p_i; p_{¡ i})$; and maximises her pro…t:

$$\underset{p_i}{Max}\, ¦_i = (p_i ¡ w + f_i)q_i: \tag{5}$$

Given the assumed linearity of the demand function, this pro…t function is concave. The su¢cient …rst order conditions determine the optimal prices p_i $(i = f1; 2g)$ chosen by the retailers as functions of $(w ¡ f_i)$: $p_i = \frac{2(1+w ¡ f_i)+b(w ¡ f_{¡ i}) ¡ b ¡ b^2}{4 ¡ b^2}$:

The second stage of the game is the Nash-bargaining over the listing fees. The Nash program of the negotiation between the producer P and retailer i is as follows:

$$\underset{f_i}{Max}(¦_P ¡ ¦_P^{sq})^{®}(¦_i ¡ ¦_i^{sq})^{1 ¡ ®} \tag{6}$$

where ® is the exogenous Nash bargaining power of the producer and $(1 ¡ ®)$ the exogenous Nash bargaining power of the retailer, $¦_P$ (resp. $¦_i$) is the pro…t of producer P (resp. retailer i) and $¦_P^{sq}$ (resp. $¦_i^{sq}$) is the statu quo pro…t earned by producer P (resp. retailer i) if the negotiation fails , i.e. if producer P only deals with retailer $¡ i$ (resp. retailer i does not deal with the producer). Given the assumption that the …rms have "passive beliefs", the statu quo pro…ts are (* denotes the equilibrium values):

$$\begin{aligned} ¦_P^{sq} &= (w ¡ f_{¡ i})q_j^{¤}(w; f_{¡ i}^{¤}; f_i^{¤}): \\ ¦_i^{sq} &= 0: \end{aligned} \tag{7}$$

The simpli…ed bilateral Nash program in the unconstrained case is written:

$$\alpha \frac{d\pi_P}{df_i}\left[\pi_i - \pi_i^{sq}\right] + (1-\alpha)\frac{d\pi_i}{df_i}\left[\pi_p - \pi_P^{sq}\right] = 0. \tag{8}$$

The resolution of the Nash program gives a unique solution. Given the value of the wholesale prices, the optimum listing fees are:

$$f_i^{\star} = w^{\star} - \frac{\alpha(2-b-b^2)}{2(2-b(b+\alpha))}. \tag{9}$$

These values fully determine the producer's profit at the first stage. Downstream price is then the same at both retailers' stores, and is denoted $p^{\star}$:

$$p^{\star} = \frac{(1-b)(2(2+\alpha)-b(2b+\alpha))}{2(2-b)(2-b(b+\alpha))}. \tag{10}$$

Profits are:

$$\pi_P^{\star} = \frac{\alpha(1-b)(2+b)\left(4-b^2(2-\alpha)-2\alpha-b\alpha\right)}{2(2-b)(1+b)(2-b(b+\alpha))^2} \tag{11}$$

$$\pi_i^{\star} = \frac{(1-b)\left(4-b^2(2-\alpha)-2\alpha-b\alpha\right)^2}{4(2-b)^2(1+b)(2-b(b+\alpha))^2}. \tag{12}$$

5.2 Constrained equilibria

at the second stage, anticipating the third stage subgame equilibrium, the simplified bilateral Nash program of the negotiation between producer P and retailer i is written:

$$\alpha \frac{f_i(1-w)^2}{(1+b)^2} - (1-\alpha)\frac{(w-f_i)(1-w)^2}{(1+b)^2} = 0. \tag{13}$$

The resolution of the Nash program gives the following optimal listing fees ($i \in \{1;2\}$):

$$\tilde{f}_i = (1-\alpha)w.$$

at the first stage, anticipating the constraint, the producer maximises his profit by fixing the wholesale price that maximises the profit of the vertical structure $(P;1;2)$: In equilibrium, the producer thus sets the following wholesale price:

$$\tilde{w} = \frac{1}{2}. \tag{14}$$

We now have to verify that this candidate is indeed an equilibrium. We first check that it is optimal for the retailers to set $\tilde{p} = \tilde{w} = \frac{1}{2}$: They will set zero margins only

if they are on the decreasing side of their profit function: the constraint has to be actually binding. We thus need to have $w_e > p^{\alpha}$ (else the retailers would benefit from setting positive margins). We study the difference $exist = w_e - p^{\alpha}$:

$$\begin{aligned} exist &\gtrless 0 \\ &\Leftrightarrow \quad \alpha \cdot \overline{\alpha_e} = \frac{b(2-b^2)}{2-b}. \end{aligned}$$

The constrained equilibrium profits are:

$$\begin{aligned} \pi_P^{\alpha} &= \frac{\alpha}{2(1+b)} \\ \pi_i^{\alpha} &= \frac{(1-\alpha)}{\alpha}\frac{\pi_P^{\alpha}}{2}. \end{aligned} \tag{15}$$

We now compare producer's profit in the constrained and unconstrained case, to determine which strategy he chooses at the first stage.

We study $\pi_P^{\alpha} - \pi_P^{\alpha}$; the difference is always positive whatever the value of $b \in]0;1]$ and $\alpha \in]0;1]$.

Finally, the ban is used by the producer as a mean to impose a floor-price for $\alpha \cdot \overline{\alpha_e}$ and in that case, the equilibrium is the constrained equiibrium where $p_e = w_e = 1/2$; the retailers sets zero margins and are paid through the negotiated fees.

5.3 Two-part listing fees

In the unconstrained case, the optimal prices p_i $(i = \{1;2\})$ chosen by the retailers as functions of $(w - f_i)$ are the same as with unit fees, since the fixed part of the fees does not change the first order conditions. However, at the second stage the Nash bargaining is influenced by the fixed fee. The equilibrium two-part listing fees are:

$$F_i^{0} = \frac{(2+b)\left(b^2 - (2-b)\alpha\right)}{16(1+b)} \tag{16}$$

$$f_i^{0} = w^{0} - \frac{b^2}{4}. \tag{17}$$

The equilibrium marginal component f_i^{0} does not depend on producer's negotiation power α. On the contrary, the equilibrium fixed fee F_i^{0} decreases in α:

Since …nal prices only depend on f_i^0; they are now independent of ®:

$$p_i^0 = \frac{2 - b}{4}: \tag{18}$$

Producer and retailers' pro…ts are:

$$\Pi_P^0 = \frac{(4 - b^2)®}{8(1 + b)} \tag{19}$$

$$\Pi_1^0 = \Pi_2^0 = \frac{(1 - ®)}{®}\frac{\Pi_P^0}{2}: \tag{20}$$

Let us now turn to the constrained case. As in section 2, equilibria with $p^0 > w^0$ are destroyed by this constraint, and new equilibria may appear.

Candidates for constrained equilibria verify:

$$\begin{cases} p_1 \cdot w \\ p_2 \cdot w \end{cases}: \tag{21}$$

The Nash bargaining program gives the optimum listing fees:

$$\begin{aligned} \mathbf{f}_i^0 &= (1 - ®)w \\ \Pi_i^{\mathbf{f}0} &= 0: \end{aligned} \tag{22}$$

Thus, as in the benchmark case, there is a continuum of solution pairs $(w^0; \mathbf{f}_i^0; \Pi_i^{\mathbf{f}0})$ for $i \in \{1; 2\}$; satisfying the Nash conditions. Replacing the optimum listing fees in the producer's pro…t function, we …nd that the optimal producer's wholesale price and pro…t are the same as those emerging without the …xed fee.

A constrained equilibrium exists if and only if $w - p^0 > 0$: Comparing (14) and (18), we prove that whatever $® \in [0; 1]$ and $b \in [0; 1]$, a constrained equilibrium always exists. Comparing (15) and (19), we prove that this strategy is always pro…table for the producer:

5.4 Ex post observability of bargaining success and failure

We still assume that the …rms bargain bilaterally and secretly, but now each retailer is able to observe, before stage 3, if the bargaining between the two other parties during stage 2 has been successful or not. Thus, if the bargaining between retailer

i and the supplier fails, retailer ¡i observes this outcome ex post, and thus may pro…tably renegotiate with the supplier in the new context where retailer ¡i acts as a downstream monopoly. The disagreement point thus di¤ers from the one developped in the paper. We here prove that our results are robust to this new speci…cation.

The last stage of the game is unchanged. The second stage of the game is the Nash-bargaining over the listing fees but the new statu quo pro…ts are:

$$\begin{aligned} \Pi_P^{sqm} &= (w - f_{-i}^m) q_{-i}^m(w; f_{-i}^m) \\ \Pi_i^{sqm} &= 0. \end{aligned} \tag{23}$$

Π_P^{sqm} is thus the pro…t realized by the producer when he bargains with a downstream monopoly. Solving the whole game in this bilateral monopoly context, we …nd that:

$$\Pi_P^{sqm} = \frac{\alpha}{8}(2 - \alpha). \tag{24}$$

The resolution of the Nash program gives a unique solution: given the value of the wholesale price, the optimum listing fees are $\overline{f}_i = \overline{w} - f(\alpha, b)$. Pro…ts Π_P and Π_i do not depend on the wholesale price.

We denote $\overline{p}$ the equilibrium retail price.

When loss-leaders are forbidden, retailer's pricing strategy may be constrained. In this case, we easily prove that status-quo are the same as those de…ned by (23) since the wholesale price $\overline{w}$ cannot be higner than p_{-i}^m (the status quo are never constrained).

$$\alpha \frac{d\Pi_P}{d\overline{f}_i}\left[\overline{\Pi}_i - \Pi_i^{sqm}\right] + (1 - \alpha)\frac{d\Pi_i}{d\overline{f}_i}\left[\overline{\Pi}_P - \Pi_P^{sqm}\right] = 0. \tag{25}$$

The solution of the Nash program gives the following optimal listing fees:

$$\overline{f}_i = \frac{\alpha(1 + 4(1 - \overline{w})\overline{w} + b(1 - \alpha) - \alpha)}{4(1 - \overline{w})(2 - \alpha)}. \tag{26}$$

at the …rst stage, anticipating the constraint, the producer maximises his pro…t by …xing the wholesale price that maximises the pro…t of the vertical structure $(P; 1; 2)$: In equilibrium, the producer thus sets the following wholesale prices:

$$\overline{w} = \frac{1}{2}. \tag{27}$$

We now have to verify that it is then optimal for the retailers to set $\overline{p} = \overline{w} = \frac{1}{2}$: They will set zero margins only if they are on the decreasing side of their pro…t func-

tion. The constraint has to be actually binding for this candidate to be an equilibrium. The constrained equilibrium pro…ts are denoted $\overline{\overline{\Pi}}_P$ and $\overline{\Pi}_i$:

Comparing $\overline{w}$ with b, we prove that such a constrained equilibrium exists if $\alpha \cdot \alpha_e(b)$. The function $\alpha_e(b)$ is such that $\alpha_e(0) = 0$ and $\alpha_e(1) = 1$, and $\alpha_e'(b) > 0$: We easily prove that $\alpha_e(b) < \overline{\alpha_e}(b)$:

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