Salience in Retailing: Vertical Restraints on Internet Sales

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Abstract: We provide an explanation for a frequently observed vertical restraint in e-commerce, namely that brand manufacturers partially or completely prohibit that retailers distribute their high-quality products over the internet. Our analysis is based on the assumption that a consumer's purchasing decision is distorted by salient thinking, i.e. by the fact that he overvalues a product attribute – quality or price – that stands out in a particular choice situation. In a highly competitive low-price environment like on an online platform, consumers focus more on price rather than quality. Especially if the market power of local (physical) retailers is low, price tends to be salient also in the local store, which is unfavorable for the high-quality product and limits the wholesale price a brand manufacturer can charge. If, however, the branded product is not available online, a retailer can charge a significant markup on the high-quality good. As the markup is higher if quality rather than price is salient in the store, this aligns the retailer's incentives with the brand manufacturer's interest to make quality the salient attribute and allows the manufacturer to charge a higher wholesale price. We also show that, the weaker are consumers' preferences for purchasing in the physical store and the stronger their salience bias, the more likely it is that a brand manufacturer wants to restrict online sales. Moreover, we find that a ban on distribution systems that prohibit internet sales increases consumer welfare and total welfare, because it leads to lower prices for final consumers and prevents inefficient online sales.

Keywords: Internet competition, Relative thinking, Retailing, Salience, Selective distribution

JEL classification: D43, K21, L42

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1. Introduction

Internet sales are becoming more and more important in retailing. In the European Union, the share of enterprises that made e-sales increased from 13% in 2008 to 20% in 2015.[1] Nowadays, retailers often engage in "click & brick", i.e. they offer goods not only at a brick-and-mortar store but also on the internet – either via an own online shop or an internet platform like *ebay* or *Amazon Marketplace*. Manufacturers, however – in particular brand producers of status and luxury products –, very often feel uneasy when retailers who distribute their goods engage in e-commerce. Correspondingly, brand manufacturers' distribution agreements frequently include provisions that partially or completely ban online sales activities.[2]

In the European Union, antitrust authorities take a tough stance on vertical restraints that limit online sales. E-commerce is not only believed to have pro-competitive effects, but is also in line with the political goal of the Internal Market. "An outright ban of on-line sales [...] is considered a hard-core restriction which amounts to an infringement by object of Article 101(1) TFEU, unless it is justified by 'objective reasons'."(OECD, 2013, p. 26).

A landmark case regarding restrictions on online sales is the ruling of the European Court of Justice (ECJ) against *Pierre Fabre Dermo-Cosmétique* in 2009.[3] *Pierre Fabre* produces cosmetics and personal care products and sells these via a selective distribution network. It required from its retailers that a pharmacist has to assist the sales of its products. The ECJ considered this requirement as a de facto ban on online sales and thus an infringement of Article 101(1) TFEU. Not only at the European, but also at the national level, courts and competition authorities have ruled against manufacturers that tried to impose a ban on sales over the internet.[4] More recently, a number of cases which attracted significant attention dealt with distribution agreements that prohibited retailers

[1] The e-sales turnover increased from 12% in 2008 to 16% in 2015 (share of e-sales to total sales). There is a lot of heterogeneity in the EU. The share of enterprises that makes e-sales ranges from 7% (Romania) to 30% (Ireland). The numbers are for the EU-28. Source: Eurostat, December 2016.

[2] In the "E-commerce Sector Inquiry" conducted by the European Commission, 50% of the responding retailers reported that they are affected by at least one contractual restriction to sell or advertise online (European Commission, 2017).

[3] ECJ, 13th October 2011, C-439/09, Pierre Fabre Dermo-Cosmétique.

[4] See for instance the ruling of French authorities in the Hi-Fi and home cinema products case, in particular the decision regarding the strategies of *Bang & Olufsen, France* (Conseil de la concurrence, 5th October 2006, Decision n°06-D-28, Bose et al.; Autorité de la concurrence, 12th December 2012, Decision n°12-D-23, Bang et Olufsen), or the fine levied on CIBA Vision, a wholesaler of contact lenses, by the *Bundeskartellamt* (Bundeskartellamt, 25th September 2009, B3-123/08).

from selling via online marketplaces and using price comparison search engines.[5] As such platforms represent an important sales channel in particular for small and medium-sized retailers, to preclude their use can be a major obstacle to participating in e-commerce and might result in a reduction of competition in the online market as well.[6]

Why do manufacturers want to restrict the distribution channels of their retailers? E-sales enhance intra-brand competition leading to lower retail prices, and thus increase the amount sold. A manufacturer is interested in the wholesale and not in the retail price and thus, all else equal, benefits from enhanced intra-brand competition. According to standard Industrial Organization theory, there is, however, a reason for the manufacturer to limit intra-brand competition if it has negative effects on the amount sold: A low markup may lead to under-investments by retailers in inventories (Krishnan and Winter, 2007), service qualities, or reduced efforts to advise consumers (Telser, 1960). Next to hold-up problems, also free-riding issues – consumers physically inspect goods at brick-and-mortar stores but then purchase online (so-called "showrooming") – can reduce retailers' investment incentives. In such cases, a restraint that limits intra-brand competition is not only in a manufacturer's but also in consumers' interest. Not surprisingly, if the nature of a product is such that it requires methods of sale that cannot be replicated over the internet, a ban of internet sales is legally considered to be justified and does not constitute an infringement of Article 101(1) TFEU. For instance, in 2002 the Liège Cour d'appel considered the internet ban of *Makro* in the market for luxury perfumes and cosmetics as legal.[7] The restriction of internet sales was assessed as justified because it protected demand enhancing investments by retailers.

From these considerations, two questions arise: (i) Absent any hold-up and free-riding problems, why do manufacturers want to impose bans on internet sales, and (ii) why do European courts worry that such a restraint is detrimental for competition and thus

[5]See, for example, the following judgments by courts and the national competition authority in Germany: the ruling in favor of *Scout* a producer of school bags, Oberlandesgericht Karlsruhe, 25th November 2009, 6 U 47/08 Kart, Scout; the ruling against *Coty* a manufacturer of luxury cosmetics, Landgericht Frankfurt a.M., 31st July 2014, 2-03 O 128/13, Coty; the ruling (partly in favor of, partly against the manufacturer) in the case of *Deuter*, a producer of high-quality hiking backpacks, Oberlandesgericht Frankfurt a.M., 22th December 2015, U 84/14, Deuter; the rulings against *Adidas* and *Asics*, producers of sportswear, Bundeskartellamt, 27th June 2014, B3-137/12, Adidas; Bundeskartellamt, 26th August 2015, B2-98/11, Asics. While the Bundeskartellamt considered a ban on marketplaces and price comparison tools as illegal, the judgments of courts differed considerably.

[6]Considering the legal assessment of restrictions to sell on platforms – a highly controversial issue in European antitrust law – the decision of the ECJ in the case of *Coty* (ECJ, C-230/16; preliminary ruling requested by the Oberlandesgericht Frankfurt a.M.), is expected to bring clarification.

[7]Cour de cassation Belgique, 10th October 2002, N° C.01.0300.F, Makro v Beauté Prestige International AO.

ultimately for consumers? We provide an answer to these questions based on the presumption that consumers' decisions are distorted by salient thinking according to Bordalo, Gennaioli, and Shleifer (2013).

The typical manufacturer that wants to restrict online sales produces an expensive branded product, a luxury or status good, such as watches, cosmetics, perfumes, etc. Consumers may purchase such a product for its expensive brand image. Online sales – in particular on platforms that are known for their low prices – can be detrimental for this brand image, which in turn is harmful to the manufacturer (Haucap and Stühmeier, 2016). The idea that, depending on the sales environment, consumers put a higher or lower relative weight on quality compared to price when making their purchasing decision is formalized by the theory of salient thinking (Bordalo, Gennaioli, and Shleifer, 2013). A key assumption on the salience function – which, in their model, determines whether quality or price is salient, i.e. stands out – is diminishing sensitivity, which implies that a consumer focuses more on quality in a high-price than in a low-price environment. For instance, a consumer is more likely to accept a markup of e.g. €10 for a high-quality bottle of wine compared to a bottle of mediocre quality in a restaurant where prices are high than at a grocery store where prices are low. Due to this effect, a brand manufacturer has an incentive to forbid online sales in order to ensure that its products are sold only in a high-price environment, where consumers – focusing on quality – have a higher willingness to pay for the branded product.

In our model, a brand manufacturer that produces a good of high quality competes against a competitive fringe that produces low quality. The goods are sold to consumers via retailers that stock both the high-quality and the low-quality product. Without online sales, each retailer is a local monopolist with his brick-and-mortar store. Each retailer may also offer the products on an internet platform, where there is perfect competition. A consumer can either purchase a good at his local store or on the internet platform. Consumers have a (mild) preference for purchasing at a physical store.[8] This preference could be due to the fact that they obtain the good immediately and do not have to wait till it is shipped. If both products are available online, online competition highly restricts the prices a retailer can charge at his physical store. In particular, if consumers' preference

[8]This assumption is also in line with the empirical observation that online prices tend to be lower than offline prices. Brynjolfsson and Smith (2000) found that prices for books and CDs are 9 to 16 % lower online than offline. In a more recent investigation, Cavallo (2017) finds lower price differences (around 4% among the products with different prices on- and offline) but reports a significant heterogeneity across different product categories.

for purchasing at a physical store is low, prices at the local store are similar to the low prices online. In this case, it is likely that price is salient at the local store and thus a consumer is willing to pay only a low markup for the branded product compared to the fringe product. Thus, the brand manufacturer can charge only a relatively low wholesale price on its product.

If the brand manufacturer bans online sales, only the fringe product is available on the internet platform. The markup a retailer can demand for the branded product is now not limited by the prices for the branded product online and, importantly, it is higher if quality is salient than if price is salient. Thus, a retailer now has an incentive to create a quality salient environment at his store, which is also in the brand manufacturer's interest. In other words, a ban on internet sales aligns a retailer's interests with the brand manufacturer's. Moreover, as a ban of internet sales increases the retail price of the branded product, it is harmful to consumer welfare.

The paper is structured as follows. Before introducing our model in Section 2, we discuss the related literature in the following paragraphs. In Section 3, as a benchmark, we discuss the case of standard rational consumers. We show that the manufacturer has no incentive to restrict online sales. Thereafter, in Section 4, we analyze the model under the assumption that consumers are salient thinkers. First, in Section 4.1, we investigate equilibrium behavior for the case of no restriction on the distribution channel, while in Section 4.2, we analyze it for the case that online sales are prohibited. In Section 4.3, we show that the brand manufacturer strictly prefers to prohibit online sales if consumers have only a mild preference for purchasing at a physical store. We discuss the welfare implications of this business practice in Section 4.4. Section 5 discusses possible extensions and robustness of our model. Section 6 summarizes our results and concludes. All proofs are relegated to the Appendix A.

Related Literature

The paper contributes to two strands of literature: On the one hand to the standard literature in Industrial Organization that investigates the effects of vertical restraints on intra-brand competition, and, on the other hand, to the recent and growing literature in Behavioral Industrial Organization.

The former literature was initiated by Telser (1960) and Yamey (1954), who noted first that strong intra-brand competition can be detrimental to retailers' incentives to invest in (free-rideable) services.[9] How resale price maintenance or exclusive territories can be used to correct for service externalities is thoroughly analyzed by Mathewson and Winter (1984) and Perry and Porter (1986).[10] While, in the above mentioned papers, the vertical restraint is used to enhance service investments and thus tends to be pro-competitive, Rey and Stiglitz (1988, 1995) point out that vertical restraints that eliminate intra-brand competition can also be used to mitigate inter-brand competition and then are anti-competitive.[11] More closely related to our paper is Hunold and Muthers (2017b), where retailers can also multi-channel, i.e. sell products at a physical store and via an online platform. They derive conditions under which price restraints (RPM and dual pricing) are more desirable to achieve chain coordination than non-price restraints (restrictions on online sales). In their model, in contrast to ours, retailers can provide services and consumers are fully rational.

Starting with DellaVigna and Malmendier (2004) and Gabaix and Laibson (2006), models of industrial organization have been extended by incorporating findings from behavioral economics.[12] Recently, there is a growing literature that investigates the implications of consumers who have context-dependent preferences for industrial organization. A prominent notion of context-dependent preferences is the theory of salient thinking developed by Bordalo, Gennaioli, and Shleifer (2013).[13] According to this theory, an attribute of a product, say quality, stands out if this product's quality-price ratio exceeds the quality-price ratio of the reference product. The attribute that stands out is salient and thus over-weighted by the consumer when making his purchasing decision. Bordalo, Gennaioli, and Shleifer (2013) show that their theory can explain demand shifts due to uniform price increases, and it can capture the decoy and compromise effect discussed in the marketing literature.[14]

The theory of salient thinking is incorporated into a duopoly model of price and quality competition by Bordalo, Gennaioli, and Shleifer (2016). They show that, depending on the

[9] For a survey on the standard IO literature regarding vertical restraints, see Katz (1989) and Rey and Vergé (2008).

[10] For an analysis of various vertical restraints, see also Rey and Tirole (1986).

[11] For more recent contributions investigating the effects of vertical restraints that tend to reduce intra-brand competition see Krishnan and Winter (2007); Jullien and Rey (2007); Asker and Bar-Isaac (2014); Hunold and Muthers (2017a).

[12] A textbook treatment of the most important contributions to Behavioral Industrial Organization is provided by Spiegler (2011).

[13] Alternative models of context-dependent preferences are Kőszegi and Szeidl (2013) and Bushong, Rabin, and Schwartzstein (2016).

[14] Empirical support for the model of salient thinking is provided by Dertwinkel-Kalt, Köhler, Lange, and Wenzel (2017).

quality-cost ratio, either price or quality is salient in equilibrium. Moreover, they derive conditions so that there is over- or under-provision of quality in equilibrium. Herweg, Müller, and Weinschenk (2017) extend this model and allow one firm to offer more than one product but model the competitor as a non-strategic competitive fringe. They show that the strategic firm can always boost its sales and profits by offering an appropriate decoy good, i.e. a good that distorts consumers' valuations but is not purchased in equilibrium. That retailers can benefit from offering decoy goods is also shown by Apffelstaedt and Mechtenberg (2016). Here, like in our model, the goods available at the store the consumer entered determine a consumer's reference good and thus whether quality or price is salient. Further contributions with consumers that are salient thinkers are Adrian (2016) in a monopolistic screening model and Inderst and Obradovits (2015) in a model of sales.[15] However, none of these models investigates the role of vertical restraints in the presence of consumers that are biased by salient thinking.

Our research question is directly addressed by Pruzhansky (2014) who investigates the incentives of a monopolistic producer of a luxury good to also sell its product over the internet. In his model, a consumer's utility from the luxury good negatively depends on the number of consumers who buy it. He finds that, in most cases, the monopolist prefers to sell also over the internet but that this is detrimental for consumer welfare. This is exactly the opposite from our finding. The model of Pruzhansky (2014) is fairly different to ours. He considers a monopolist who sells a luxury good directly to consumers. We consider a brand manufacturer that faces competition. Moreover, customers are reached via retailers and thus vertical restraints are important.

2. The Model

We consider a vertically related industry where, on the upstream market, a brand manufacturer (M) competes against a competitive fringe. The brand manufacturer produces a branded product of high quality q_H at per-unit cost c_H. The remaining upstream firms, which form the competitive fringe, are identical and produce a good which is an imperfect substitute to the branded product. Each fringe firm operates with constant marginal cost $c_L \leq c_H$ and produces a good of low quality q_L, with $0 < q_L < q_H$.

The products are distributed to consumers via retailers. There are $r \geq 2$ independent and identical retail markets. In each market, there is only one retailer active, i.e. retailers

[15] A similar model where firms can impose hidden fees is analyzed by Inderst and Obradovits (2016).

are local monopolists. Each retailer stocks at most the products of two brands, i.e. typically, a retailer stocks the brand manufacturer's product next to the product of one fringe firm.

Next to selling the products in the brick-and-mortar store, retailers can also offer the products on an online platform. We abstract from any retailing cost and assume that the wholesale prices paid to the manufacturers are the only costs of a retailer, i.e. there are no commissions collected by the online platform.

The products of the fringe firm are sold at a unit wholesale price $w_L = c_L$, due to perfect competition between these firms. Moreover, a fringe firm's product can be distributed by retailers without any restraints on the distribution channel. Hence, low-quality products are always available on the online platform.

The brand manufacturer, on the other hand, may impose restrictions on the distribution channels for its retailers. The brand manufacturer makes a nondiscriminatory take-it-or-leave-it offer (w, D) to each retailer. The contract offer specifies, next to a unit wholesale price w, whether retailers are allowed to sell the branded good via the online platform.[16] More precisely, $D \in \{F, R\}$: under distribution system F, retailers are free to offer the good on the online platform, whereas under the restricted distribution system R, they are allowed to sell the branded good only in the physical store.

In each local market, there are two consumers, a type H and a type L consumer who differ in their willingness to pay for quality: A consumer of type H has a high willingness to pay for quality; he cares about both quality and price and thus purchases either the high- or the low-quality product. For a type L consumer instead, the marginal willingness to pay for a quality exceeding q_L is (close to) zero. He cares only about the price and thus, on the equilibrium path, always buys the low-quality product.[17] Each consumer always purchases one unit of the good, either at the local store or on the online platform. In other words, we assume that the fringe product is sufficiently valuable so that purchasing the fringe product online is always preferred to the outside option.

Importantly, consumers have a (slight) preference for purchasing in a physical store rather than online. This preference could reflect that (i) in the local store, the consumer obtains the good immediately, whereas when purchasing online, he has to wait till it is shipped, (ii) it is easier to complain about a product failure at a physical store, (iii)

[16] The manufacturer cannot specify different wholesale prices for online and offline sales. Next to being hard to monitor for the manufacturer, such a practice is also considered as illegal in the EU.

[17] Armstrong and Chen (2009) also build a model where a fraction of consumers shops on the basis of price alone without taking quality into account.

consumers prefer to interact with a human being rather than a computer, etc.[18] If neither of the product's attributes are particular salient, a consumer of type $\theta \in \{L, H\}$'s utility when purchasing quality q at price p is

$$u_\theta^E(p, q) = v_\theta(q) - p + \delta\mathbb{I}. \tag{1}$$

The term $\delta\mathbb{I}$, with $\delta > 0$, captures the consumer's preference for purchasing in a brick-and-mortar store; $\mathbb{I} \in \{0, 1\}$ is an indicator function that equals one if the consumer buys in the physical store and zero otherwise. For simplicity we set $v_H(q) = q$ and $v_L(q) = \min\{q, q_L\} = q_L$. The function u_θ^E reflects the consumer's unbiased preferences, i.e. his experience utility.

A consumer's purchasing decision, however, is affected – distorted – by the salience of either attribute quality or attribute price. Precisely, we posit that consumers are salient thinkers according to the concept of Bordalo, Gennaioli, and Shleifer (2013). When evaluating a product, a salient thinker inflates the weight of the attribute that he perceives to be salient, i.e. the attribute that, relative to the product's other attributes, "stands out" most when compared to the respective attribute of a reference product. We posit that the reference good is the average good available in a certain choice situation $C = S, I$, where $C = S$ refers to the brick-and-mortar store and $C = I$ to the online platform.[19] This implies that, in our model, salience (for all goods) is always determined only by the two different goods the consumer actually observes in the respective shopping environment.[20] In the case of two goods, the same attribute is salient for all products, i.e. the environment either is a quality- or a price-salient one. More precisely, quality is salient in a given choice situation if the ratio of the branded good's high quality to the fringe product's low quality is weakly larger than the ratio of prices, i.e. if

$$\frac{q_H}{q_L} \geq \frac{p_H^C}{p_L^C}. \tag{2}$$

[18] Analyzing price and sales data for consumer electronics products in the EU, Duch-Brown, Grzybowski, Romahn, and Verboven (2017) find that indeed, for the average consumer, the disutility from shopping online outweighs the benefits. Similarly, Forman, Ghose, and Goldfarb (2009, p.47) report that even for books "the disutility costs of purchasing online are substantial". The assumption of a disutility cost for buying online is also common in the theoretical literature investigating the online-offline channel substitution (Balasubramanian, 1998).

[19] In the original approach of Bordalo, Gennaioli, and Shleifer (2013), all goods between which the consumer can choose form the choice set that determines salience. Thus, in the original theory, salience does not depend on the particular choice situation.

[20] Note that if the consumer purchases at the online platform, he can choose between n products. $n - 1$ of these products, however, are identical as they have the same quality and are offered at the same price.

If, on the other hand, the price ratio is larger than the quality ratio, price is salient.[21] The consumer's decision utility is given by

$$u_\theta(p,q) = \begin{cases} \frac{1}{\gamma} v_\theta(q) - p + \delta \mathbb{I} & \text{if quality is salient} \\ \gamma v_\theta(q) - p + \delta \mathbb{I} & \text{if price is salient} \end{cases} \tag{3}$$

where $\gamma \in (0,1]$ captures the extent to which the consumer's perceived utility is distorted by salience. For $\gamma = 1$, the decision utility is not affected by salience. In order to ensure that the brand manufacturer can always make a positive profit, we assume that

$$\gamma > \frac{c_H - c_L}{q_H - q_L} \geq 0. \tag{4}$$

The sequence of events is as follows:

1. The manufacturer offers each retailer the same contract (w, D).
2. Each retailer decides whether or not to accept the manufacturer's offer. Retailers set prices for the goods they offer in the brick-and-mortar store and prices for the goods they offer on the online platform.
3. Each consumer enters the local brick-and-mortar store in order to figure out which quality suits him best. The consumer is aware of the prices and goods available at the online platform. His perceived utility for all goods is determined by whether quality or price is salient in the store. Based on this utility, the consumer decides whether to purchase a good in the brick-and-mortar store.
4. Consumers who have not purchased a good in the brick-and-mortar store may purchase a good on the online platform. The salience is now determined by the prices and qualities available on the online platform.

The equilibrium concept employed is subgame perfect Nash equilibrium in pure strategies. In order to obtain well-defined solutions, we impose the following tie-breaking rules: (i) When being indifferent whether or not to offer the high-quality branded product, a retailer offers the branded product. (ii) A consumer who is indifferent between purchasing in the brick-and-mortar store or on the online platform purchases in the brick-and-mortar store. (iii) A type H consumer who is indifferent between purchasing the high- or the low-quality product purchases the high-quality product.

3. Rational Benchmark

First, as a benchmark, we consider the case of rational consumers whose purchasing decisions are not affected by the salience of a particular product feature, i.e. $\gamma = 1$.

[21] For further details see Bordalo, Gennaioli, and Shleifer (2016).

Suppose the brand manufacturer charges unit wholesale price w and does not restrict its retailers' distribution channel. In this case, both products are available on the online platform. On the platform, retailers are not differentiated which means we have perfect Bertrand competition driving down prices to marginal costs. Thus, the internet prices for the high-quality branded and the low-quality fringe product are

$$p_H^I = w \quad \text{and} \quad p_L^I = c_L. \tag{5}$$

In each local (regional) market, there is only one retailer. Each consumer has a willingness to pay of $\delta > 0$ for purchasing at a physical store. This gives the retailer some market power and allows him to charge prices above costs. This markup, however, is restricted to δ by online offers; i.e. if, for a given quality, a retailer charges a markup of more than δ, each consumer prefers to purchase this quality online instead of at the brick-and-mortar store. A markup of δ obviously is optimal for the fringe product, so that it costs $p_L^S = c_L + \delta$ at the local store. If the retailer charges a markup of δ also for the branded product, i.e. if $p_H^S = w + \delta$, a consumer of type H purchases the high-quality product if

$$w \leq (q_H - q_L) + c_L \equiv \hat{w}, \tag{6}$$

i.e. as long as the wholesale price is not too high. For wholesale prices larger than $\hat{w}$, a type H consumer's best alternative to purchasing the branded product at the local store is no longer to purchase it online, but to purchase the fringe product, either at the store or online. In this case, it is optimal for the retailer to sell the fringe product at a markup of δ also to the type H consumer and not to stock the branded product (or to offer the branded product at an unattractively high price such as $p_H^S = w + \delta$). Irrespective of the wholesale price, the retailer makes a profit of $\pi = 2\delta$.

The manufacturer makes positive sales and thus a positive profit only if $w \leq \hat{w}$. Thus, the optimal wholesale price under a free distribution system is $w^F = (q_H - q_L) + c_L$ and the corresponding profit per retailer is $\Pi^F = (q_H - q_L) - (c_H - c_L)$.

Now, suppose the manufacturer forbids its retailers to offer the product online so that on the internet, consumers can purchase only the fringe product, at $p_L^I = c_L$. By the same reasoning as above, a retailer charges $p_L^S = c_L + \delta$ in the physical store. A type H consumer prefers to buy the branded product instead of the fringe product if

$$p_H^S \leq (q_H - q_L) + c_L + \delta. \tag{7}$$

If the local store offers the branded product, it will charge the highest feasible price, i.e. $p_H^S = (q_H - q_L) + c_L + \delta$. The retailer offers the branded product only if he can earn a profit of at least δ from it. Otherwise, he prefers to sell the fringe product – for which he can always charge a markup of δ – to both consumer types. This means that a local retailer stocks the branded product if and only if $w \leq \hat{w}$. He always makes a profit of $\pi = 2\delta$. Thus, under distribution system R, the manufacturer optimally charges $w^R = \hat{w}$ and makes a profit of $\Pi^R = (q_H - q_L) - (c_H - c_L)$ per retailer that it serves.

Proposition 1 (Rational Benchmark)**.** *The brand manufacturer is indifferent between the free and the restricted distribution system,* $\Pi^F = \Pi^R$.

According to Proposition 1, there is no rationale for the brand manufacturer to restrict the distribution channels of its retailers. If anything, a distribution system under which online sales are restricted allows the retailers to charge a higher markup for the branded product because the disciplining effect of the competitive online market is absent. Hence, in a model with elastic demand and thus a double markup problem (Spengler, 1950), the brand manufacturer would strictly prefer a free to a restricted distribution system.

4. Consumers are Salient Thinkers

Now, we posit that consumers are salient thinkers, i.e. $\gamma < 1$. When being at a local store, a consumer's willingness to pay for a certain product depends on the prices and quality levels available to him at this store. We separately consider the optimal behavior of a retailer under a free and a restricted distribution system, respectively. Thereafter, we investigate the behavior of the manufacturer and show when it is optimal for it to restrict the distribution channel.

4.1. Free Distribution

Suppose the brand manufacturer does not impose restrictions on online sales. Thus, all retailers can offer, next to the fringe product, also the high-quality branded product on the internet platform. As the retailers are not differentiated there, they compete fiercely à la Bertrand. This drives down the internet prices to costs:[22]

$$p_L^I = c_L \quad \text{and} \quad p_H^I = w. \tag{8}$$

In his local market, each retailer has some market power, which allows him to charge prices above costs. The highest possible price a retailer can charge at the physical store is the online price plus δ; otherwise consumers prefer to purchase the respective product on the online platform. Thus, a retailer can make a profit of at most $\pi = 2\delta$. It is important to note that these considerations are independent of whether quality or price is salient in the local store.

Suppose a retailer charges $p_L^S = c_L + \delta$ and $p_H^S = w + \delta$ at his brick-and-mortar store. This is an optimal pricing strategy for the retailer as the store's offers weakly dominate the online offers, inducing both consumers to purchase in the store. The type L consumer purchases the low-quality product; the type H consumer purchases the branded product only if the wholesale price w is not too high. For too high a wholesale price, type H buys the fringe product in the store. In both cases, the retailer earns a markup δ from the H consumer.

How large the wholesale price can be, so that the type H consumer still prefers to buy the branded instead of the fringe product, depends on whether quality or price is salient in the store. If quality is salient, the type H consumer purchases the branded product if and only if

$$\frac{1}{\gamma} q_H + \delta - (w + \delta) \geq \frac{1}{\gamma} q_L + \delta - (c_L + \delta) \tag{9}$$

$$\iff w \leq \frac{1}{\gamma}(q_H - q_L) + c_L \equiv \hat{w}_Q. \tag{10}$$

If, on the other hand, price is salient, a type H consumer purchases the branded product if and only if

$$\gamma q_H + \delta - (w + \delta) \geq \gamma q_L + \delta - (c_L + \delta) \tag{11}$$

$$\iff w \leq \gamma(q_H - q_L) + c_L \equiv \hat{w}_P. \tag{12}$$

Note that $\hat{w}_P < \hat{w}_Q$: The maximum wholesale price that can be charged is higher if quality is salient at the store. Correspondingly, the brand manufacturer cares about the

[22] This is the unique equilibrium outcome if there are many retailers/markets, i.e. if r is not too small. If there are only few retailers (r is low) and the salience bias is severe (γ is low), then there can also exist other symmetric equilibrium outcomes with $p_H^S > w$. If this is true, lowering the internet price does not attract sufficiently many new consumers to compensate a retailer for the reduction in profits made with the captive type H consumer.

salience in the store and prefers a quality salient environment. The retailer, however, does not benefit from the consumer's higher willingness to pay for q_H under quality salience. His markup is always restricted to δ. Therefore, the retailer has no interest to distort the prices in order to make quality salient in the brick-and-mortar store.

If the retailer charges a markup of δ on both products, then quality is salient in the store if and only if

$$\frac{q_H}{q_L} \geq \frac{w+\delta}{c_L+\delta} \tag{13}$$

$$\iff w \leq \frac{q_H}{q_L}c_L + \frac{q_H - q_L}{q_L}\delta \equiv \tilde{w}. \tag{14}$$

It is important to note that the salience constraint (13) is "more likely" to be satisfied for a given w (in the sense of set inclusion), the stronger consumers' preferences are for the local store, i.e. the higher δ is. The higher δ, the larger is the price level in the local store and thus – for a given absolute price difference between the high- and the low-quality product – the more likely it is that quality is salient. This is a core property of the model of salient thinking developed by Bordalo, Gennaioli, and Shleifer (2013).

The manufacturer wants to charge the highest feasible wholesale price so that its product is purchased by type H consumers. He knows that each retailer charges a markup of δ in his local store and thus that quality is salient only if $w \leq \tilde{w}$. As long as this wholesale price critical for salience is at least as high as $\hat{w}_Q$ – which is equivalent to $\delta \geq q_L/\gamma - c_L$, the manufacturer is not restricted in its price setting. He can charge the highest possible wholesale price, i.e. $w^F = \hat{w}_Q$, where compared to the fringe product, the branded good is marked up by the perceived (the inflated) quality difference under quality salience. For higher wholesale prices, a consumer never purchases the branded product. If, however, δ is lower, quality is salient at the store only if the manufacturer chooses a wholesale price $w \leq \tilde{w} < \hat{w}_Q$. There remain two potentially optimal strategies: (i) setting $w = \tilde{w}$ so that quality is just salient, or (ii) setting $w = \hat{w}_P$, i.e. charging the highest feasible markup under price salience. The former strategy is optimal if and only if $\tilde{w} \geq \hat{w}_P$, which is equivalent to

$$\gamma q_L - c_L \leq \delta. \tag{15}$$

If consumers have only a weak preference for purchasing at a local store, $\delta < \gamma q_L - c_L$, a wholesale price $w^F = \hat{w}_P$ is optimal. In this case, price is salient in the store.

The following proposition summarizes these observations.

Proposition 2 (Free Distribution)**.**

(I) For a weak preference of the consumers to purchase at a local store, $\delta < \gamma q_L - c_L$, the manufacturer charges $w^F = \hat{w}_P$. Price is salient in the store and both consumer types purchase at the brick-and-mortar store.

(II) For an intermediate preference of the consumers to purchase at a local store, $\gamma q_L - c_L \leq \delta < q_L/\gamma - c_L$, the manufacturer charges $w^F = \tilde{w}$. Quality is salient in the store and both consumer types purchase at the brick-and-mortar store.

(III) For a strong preference of the consumers to purchase at a local store, $\delta \geq q_L/\gamma - c_L$, the manufacturer charges $w^F = \hat{w}_Q$. Quality is salient in the store and both consumer types purchase at the brick-and-mortar store.

The stronger are consumers' preferences for purchasing at a brick-and-mortar store instead of online, the higher is the market power of each retailer and, correspondingly, the higher is the markup he charges compared to the internet prices. A higher markup results in a higher overall price level in the store which makes it more likely that quality is salient. For a high price level, case (III) of Proposition 2, quality is salient for all relevant wholesale prices and thus the manufacturer charges $w^F = \hat{w}_Q$ and makes a profit of $\Pi^F = \hat{w}_Q - c_H$ per retailer. The prices at the brick-and-mortar store are $p_H^S = (q_H - q_L)/\gamma + c_L + \delta$ and $p_L^S = c_L + \delta$. For an intermediate price level, case (II) of Proposition 2, the manufacturer charges a wholesale price that leaves quality just salient, i.e. $w = \tilde{w}$. The per retailer profit is $\Pi^F = \tilde{w} - c_H$. The retailer charges $p_H^S = (q_H/q_L)(c_L + \delta)$ and $p_L^S = c_L + \delta$ at its brick-and-mortar store. For a low price level at the brick-and-mortar store, case (I) of Proposition 2, it is too costly for the manufacturer to charge a wholesale price that orchestrates quality salient. The optimal wholesale price is $w^F = \hat{w}_P$ leading to a per retailer profit of $\Pi^F = \hat{w}_P - c_H$. The retailer charges $p_H^S = \gamma(q_H - q_L) + c_L + \delta$ and $p_L^S = c_L + \delta$ at its brick-and-mortar store, where in this case price is salient. In all cases, both consumer types purchase at a brick-and-mortar store. Type L purchases quality q_L and type H quality q_H.

4.2. Restricted Distribution

Under the free distribution system, a retailer has no preferences for quality or price salience in the store because his markup is bounded by δ due to competition from the online platform. This changes dramatically if the manufacturer operates a distribution system under which online sales are forbidden. Now, the markup on the branded product can be higher than δ and depends on whether quality or price is salient in the store.

First, note that due to perfect competition on the internet, we have $p_L^I = c_L$. The branded product is not sold online and only available in the brick-and-mortar stores. Thus, if a retailer wants to sell the fringe product at his local store, the optimal price is $p_L^S = c_L + \delta$. It is important to point out that a retailer can always ensure himself a profit of $\pi = 2\delta$ by charging $p_L^S = c_L + \delta$ and a prohibitively high price for the branded product. In this case, both consumer types purchase the fringe product at the local store. Hence, the brand manufacturer has to take into account that the wholesale price it charges from the retailer allows him to earn a profit of at least δ on sales of the branded product.

Consider a retailer who wants to sell a positive amount of both products. The highest price it can charge for the branded product makes a type H consumer indifferent between purchasing high quality at the store and low quality at the store. This maximal price depends on whether quality or price is salient in the store: If quality is salient, a type H consumer purchases the branded product if and only if

$$\begin{aligned} \frac{1}{\gamma} q_H + \delta - p_H &\geq \frac{1}{\gamma} q_L + \delta - c_L - \delta \\ \iff p_H &\leq \underbrace{\frac{1}{\gamma}(q_H - q_L) + c_L}_{=\hat{w}_Q} + \delta. \end{aligned} \tag{16}$$

If, on the other hand, price is salient in the local store, the price of the branded good is bounded by

$$p_H \leq \underbrace{\gamma(q_H - q_L) + c_L}_{=\hat{w}_P} + \delta. \tag{17}$$

Thus, for a given wholesale price, the retailer prefers a quality to a price salient environment because $\hat{w}_Q > \hat{w}_P$. For $p_H^S = \hat{w}_Q + \delta$ and $p_L^S = c_L + \delta$, quality is indeed salient in the local store if and only if

$$\begin{aligned} \frac{q_H}{q_L} &\geq \frac{\hat{w}_Q + \delta}{c_L + \delta} \\ \iff \quad \delta &\geq \frac{1}{\gamma}\, q_L - c_L. \end{aligned} \tag{18}$$

If condition (18) holds and $w \leq \hat{w}_Q$ so that the profit he earns from selling the high-quality product is at least δ, then charging $p_H^S = \hat{w}_Q + \delta$ and $p_L^S = c_L + \delta$ is an optimal strategy for the retailer. This case is also optimal for the brand manufacturer who can charge a wholesale price of $w = \hat{w}_Q$. For higher wholesale prices, the branded product is never sold.

If condition (18) is violated – i.e. if consumers do not have a strong preferences for purchasing at a local store –, then a retailer who wants to sell the branded product at his local store cannot charge $p_H^S = \hat{w}_Q + \delta$ and $p_L^S = c_L + \delta$. He can choose between three potentially optimal alternative strategies:

First, the retailer can set the branded product's price so that quality is just salient, i.e. $p_H^S = (c_L + \delta)(q_H/q_L)$. If the retailer selects this strategy, the brand manufacturer can charge a wholesale price of at most $w = \tilde{w}$. For higher wholesale prices, the markup is less than δ so that the retailer prefers to sell only the fringe product.

Secondly, the retailer can acquiesce in price salience and charge $p_H^S = \gamma(q_H - q_L) + c_L + \delta$. Under this strategy, the brand manufacturer can charge a wholesale price of at most $w = \hat{w}_P$.

Thirdly, and most interestingly, the retailer can decide to make quality salient by increasing the price he charges for the fringe product, p_L^S, for instance, by setting $p_L^S = p_H^S$. This allows him to charge a price of $p_H^S = \hat{w}_Q + \delta$ for the branded product. The fringe product, however, is now too expensive at the local store and the type L consumer prefers to buy it on the internet platform. This implies that the retailer looses the type L consumer who generates a profit of δ. Hence, this strategy can be optimal only if the markup the retailer can charge on the high-quality product is at least 2δ. This restricts the wholesale price the manufacturer can charge in this case to $w = \hat{w}_Q - \delta$.

For the retailer, the wholesale price is given and he chooses the strategy that allows him to make the highest profit. Typically, this is the strategy that allows for charging the highest price for the branded product. This behavior of the retailer is also in the interest of the brand manufacturer: The higher the price of the branded product, the higher is the wholesale price the manufacturer can charge. The optimal strategy depends on the exogenous parameters, in particular on how strong consumers' preferences for purchasing at a local store are. The following proposition summarizes the equilibrium behavior under a distribution system with restrictions on online sales.

Proposition 3 (Restricted Distribution)**.**

(I) Let the consumers' preferences to purchase at a local store be weak, $\delta < \gamma q_L - c_L$.

- *(a) For* $\delta < \min\left\{\frac{1-\gamma^2}{\gamma}(q_H - q_L), \gamma q_L - c_L\right\}$, *the manufacturer charges* $w^R = \hat{w}_Q - \delta$. *Quality is salient in the store and only type* H *consumers purchase at the brick-and-mortar store.*
- *(b) For* $\frac{1-\gamma^2}{\gamma}(q_H - q_L) < \delta < \gamma q_L - c_L$, *the manufacturer charges* $w^R = \hat{w}_P$. *Price is*

salient in the store and both consumer types purchase at the brick-and-mortar store.

(II) *Let the consumers' preferences to purchase at a local store be intermediate, $\gamma q_L - c_L \le \delta < q_L/\gamma - c_L$.*

(a) *For $\gamma q_L - c_L \le \delta < \left(\frac{1}{\gamma} q_L - c_L\right)\left(\frac{q_H - q_L}{q_H}\right)$, the manufacturer charges $w^R = \hat{w}_Q - \delta$. Quality is salient in the store and only type H consumers purchase at the brick-and-mortar store.*

(b) *For $\max\left\{\gamma q_L - c_L, \left(\frac{1}{\gamma} q_L - c_L\right)\left(\frac{q_H - q_L}{q_H}\right)\right\} \le \delta < q_L/\gamma - c_L$, the manufacturer charges $w^R = \tilde{w}$. Quality is salient in the store and both consumer types purchase at the brick-and-mortar store.*

(III) *Let the consumers' preferences to purchase at a local store be strong, $\delta \ge q_L/\gamma - c_L$. Then, the manufacturer charges $w^R = \hat{w}_Q$. Quality is salient in the store and both consumer types purchase at the brick-and-mortar store.*

It is important to note that case (I)(b) of Proposition 3 exists if and only if

$$(1 - \gamma^2) q_H < q_L - \gamma c_L, \tag{19}$$

while case (II)(a) exists if and only if the opposite is true.

When the consumers have a strong preference for purchasing at a local store, a retailer can charge a high price at the store for the low-quality product which is also available online. This leads to a high price level in the store which makes quality salient. The retailer charges $p_H^S = (q_H - q_L)/\gamma + c_L + \delta$ for the branded product and the brand manufacturer demands $w^R = \hat{w}_Q$.

For a slightly weaker preference of the consumers to purchase at a local store, it is optimal for the retailer to set the price for the branded product such that quality is just salient, i.e. $p_H^S = (c_L + \delta)(q_H/q_L)$. For a relatively high δ, the necessary reduction in the price in order to make quality salient in the store is moderate. In this case, the manufacturer sets $w^R = \tilde{w}$.

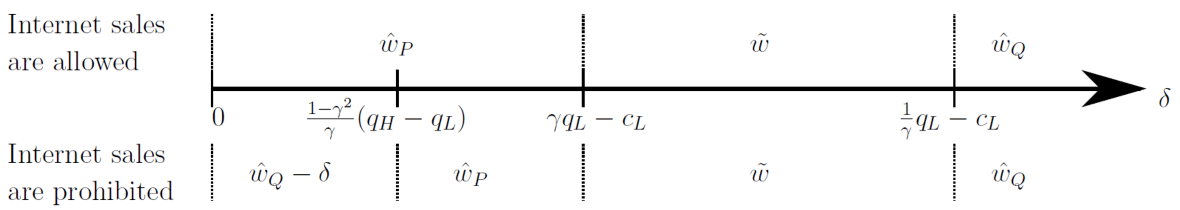
If consumers have only a weak preference for purchasing at the local store, the markup on the low-quality fringe product is low. Correspondingly, the price level in the local store is relatively low if the retailer sells both products. This highly restricts the price the retailer can charge for the branded product if he wants to keep quality salient. Thus, the retailer either sells both products and accepts that price is salient or sells only the high-quality product. In the former case the retailer charges $p_H^S = \gamma(q_H - q_L) + c_L + \delta$ and the manufacturer $w^R = \hat{w}_P$. In the latter case, the retailer sets $p_H^S = p_L^S = (q_H - q_L)/\gamma + c_L + \delta$

and the manufacturer charges $w^R = \hat{w}_Q - \delta$.[23] In this case, the manufacturer has to set the wholesale price such that the retailer can make a profit of 2δ per unit of the branded product sold. In other words, this strategy is relatively costly to the manufacturer if δ is high. Thus, this strategy occurs in equilibrium only for low levels of δ, i.e. only when the market power of a local store is weak.

4.3. Optimal Distribution System

Having analyzed the equilibrium behavior under a given distribution system, we can now answer the question which distribution system, free or restricted, the brand manufacturer should adopt. We say that the brand manufacturer prefers a restricted distribution system under which online sales are prohibited to a free distribution system if its profits are strictly higher under the former than under the latter, i.e. if $\Pi^R > \Pi^F$. In order to answer this question, we distinguish two cases: (i) condition (19) holds, and (ii) condition (19) is violated. The two comparisons are depicted in Figure 1.

a) $(1-\gamma^2)q_H < q_L - \gamma c_L$



b) $(1-\gamma^2)q_H \geq q_L - \gamma c_L$

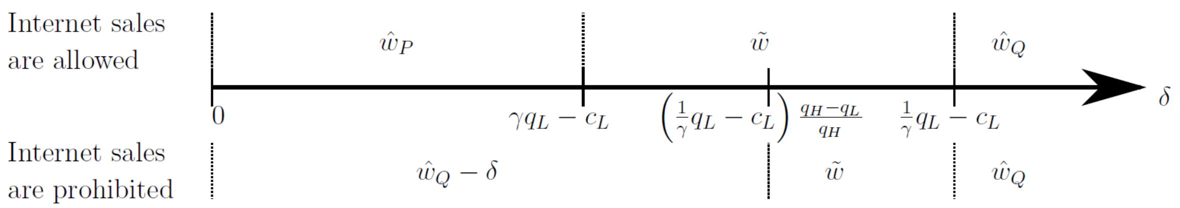


Figure 1: Comparison of the two distribution systems.

Suppose condition (19) holds. This case is depicted in part (a) of Figure 1. For $\delta \geq \frac{1-\gamma^2}{\gamma}(q_H - q_L)$, the brand manufacturer's optimal wholesale price is independent

[23] The price for the low quality product at the local store is not uniquely defined. It has to satisfy the following condition:

$$p_L^S \geq \frac{q_L}{q_H}\left(\frac{1}{\gamma}(q_H - q_L) + \delta + c_L\right).$$

Thus, also prices $p_L^S < p_H^S$ are optimal.

of whether or not online sales are prohibited. Put differently, the brand manufacturer is indifferent between the free and the restricted distribution system and thus selects the free distribution system. For $\delta < \frac{1-\gamma^2}{\gamma}(q_H - q_L)$ the brand manufacturer charges $w^F = \hat{w}_P$ under the free distribution system and $w^R = \hat{w}_Q - \delta$ under the restricted distribution system. A comparison of the two wholesale prices reveals that $\hat{w}_Q - \delta > \hat{w}_P$ in the relevant parameter range. Thus, if consumers have only a weak preference for purchasing at a local store, it is optimal for the brand manufacturer to forbid online sales, i.e. to adopt the restricted distribution system.

Now, suppose condition (19) is violated. This case is depicted in part (b) of Figure 1. Again, for relatively high preferences to purchase at a local store, $\delta \geq (q_L/\gamma - c_L)(q_H - q_L)/q_H$, the wholesale price is independent of the distribution system. The indifferent brand manufacturer adopts the free distribution system and thus does not restrict online sales of its products. If, however, consumers have only relatively weak preference for purchasing at a local store, $\delta < (q_L/\gamma - c_L)(q_H - q_L)/q_H$, the brand manufacturer's wholesale price depends on whether or not online sales are prohibited. If online sales are prohibited, it charges $w^R = \hat{w}_Q - \delta$. The wholesale price charged under free distribution depends on δ. For moderate levels of δ, the manufacturer chooses $w^F = \tilde{w}$, while it chooses $w^F = \hat{w}_P$ for low levels of δ . For the relevant range of parameters, it can be shown that $\hat{w}_Q - \delta > \tilde{w}$ and $\hat{w}_Q - \delta > \hat{w}_P$. In other words, the brand manufacturer prefers to forbid online sales in these cases where the preferences for purchasing at a local store are relatively weak.

Now, we can state our main finding.

Proposition 4 (Comparison of Distribution Systems)**.**

(a) Suppose (19) *holds. The manufacturer strictly prefers a restricted distribution system under which online sales are prohibited to a free distribution system iff*

$$\delta < \frac{1-\gamma^2}{\gamma}(q_H - q_L) \equiv \bar{\delta}_a.$$

(b) Suppose (19) *does not hold. The manufacturer strictly prefers a restricted distribution system under which online sales are prohibited to a free distribution system iff*

$$\delta < \left(\frac{1}{\gamma}q_L - c_L\right)\frac{q_H - q_L}{q_H} \equiv \bar{\delta}_b.$$

The brand manufacturer strictly prefers to forbid online sales if consumers have a weak or only moderate preference for purchasing at a physical store. In these cases, the market power of each local store is limited and thus the price level is low if both products are also available online. Due to the low price level, price is salient in the store, which is not in the interest of the brand manufacturer. If, however, the brand manufacturer forbids online sales, a retailer can earn more than the low markup of δ on sales of the branded product. This creates an incentive for each retailer to render quality salient at his store, which is also beneficial for the brand manufacturer. In other words, the restricted distribution system allows the brand manufacturer to align retailers' interests with its own, i.e. the imposed vertical restraint facilitates coordination of the supply chain. This feature is shared by orthodox models of industrial organization that investigate the role of vertical restraints, like resale price maintenance, exclusive territories, and many others. The crucial difference is that, in our model, the necessity for supply chain coordination is rooted in consumers' behavioral bias – salient thinking.

How crucial is the consumers' bias for the result that a restricted distribution system can be optimal? Note that if consumers are (close to) rational, $\gamma \approx 1$, then (19) holds. This implies that, according to Proposition 4, forbidding online sales is optimal if and only if $\delta < 0$, which is never the case. On the other hand, the stronger consumers' salience bias (the lower γ), the larger is the range of parameter values for which the brand manufacturer strictly prefers to forbid online sales.

Corollary 1. *A restricted distribution system under which online sales are prohibited is "more likely" (in the sense of set inclusion) to be optimal, the more severe consumers' salience bias is. Formally,* $\bar{\delta}_a'(\gamma) < 0$ *and* $\bar{\delta}_b'(\gamma) < 0$.

4.4. Welfare Implications

In this section, we investigate the welfare implications of a ban on distribution systems under which online sales are prohibited. That is, we assume that there is a law maker or an antitrust authority that can forbid certain vertical restraints. In the legal assessment of these restraints, a consumer welfare standard is applied.[24] Nevertheless, we briefly comment on the implications of such a ban for total welfare.

With biased consumers, welfare analysis is intricate because preferences are not stable but affected by the choice environment, i.e. by the salience of price or quality at the

[24]The following quote from Joaquín Almunia, who was commissioner in charge of competition policy at that time, nicely illustrates that this is also the welfare standard applied by the European Commission: "Competition policy is a tool at the service of consumers. Consumer welfare is at the heart of our policy and its achievement drives our priorities and guides our decisions" (Competition and consumers: the future of EU competition policy, speech at European Competition Day, Madrid, 12 May 2010).

local store. In order to deal with this issue, we posit that the utility function distorted by salience corresponds to a consumer's *decision utility.* A consumer's *experienced* or *consumption utility* – the hedonic experience associated with the consumption of the good – is given by his unbiased utility function, $u_\theta^E = v_\theta(q) - p + \delta\mathbb{I}$.[25] This assumption seems plausible for goods that are not consumed immediately after purchase, which includes most goods that are typically sold online. These goods are likely to be durable – non-perishable – goods for which the salience of attributes at the point of sale should have only a minor impact on the experienced consumption utility weeks or months later.[26]

A ban on prohibiting internet sales has either no impact (large δ), or it leads to lower wholesale prices for the branded product that translate into lower final good prices (small δ). Thus, the following result is readily obtained.

Proposition 5 (Welfare)**.** *Suppose that either* (19) *holds and* $\delta < \bar{\delta}_a$ *or that* (19) *is violated and* $\delta < \bar{\delta}_b$*. Then, a ban on distribution systems under which online sales are prohibited leads to lower final prices of the branded product, which increases consumer welfare.*

For low levels of δ, price is salient in a local store if internet sales are allowed, while quality is salient if internet sales are prohibited. In the former case, the prices in the store are $p_H^S = \gamma(q_H - q_L) + c_L + \delta$ and $p_L^S = c_L + \delta$, and both consumer types purchase there. If, on the other hand, internet sales are prohibited, the price for the branded product at the local store is $p_H^S = (q_H - q_L)/\gamma + c_L + \delta$. A type H consumer still purchases the branded product at his local store but now has to pay a higher price. A type L consumer purchases the fringe product on the internet at $p_L^I = c_L$. His experienced utility is independent of whether or not internet sales are allowed.

For intermediate levels of δ so that $w^F = \tilde{w}$ and $w^R = \hat{w}_Q - \delta$ (see Figure 1 (b)), quality is salient under either distribution system. If online sales are allowed, the salience constraint restricts the brand manufacturer – and the retailer alike – in its price setting. The prices at a local store are $p_H^S = \tilde{w} + \delta$ and $p_L^S = c_L + \delta$. Both consumer types purchase at a local store. If internet sales are prohibited, the price for the branded product at a local store is again $p_H^S = (q_H - q_L)/\gamma + c_L + \delta > \tilde{w} + \delta$. Thus, a type H consumer, who purchases the high-quality product at his local store, is again harmed if internet sales are

[25] For an elaborate discussion on the differences between decision and experienced utility see Kahneman and Thaler (2006).

[26] For goods that are consumed at the point of sale, like meals at a restaurant, the biased decision utility might be a more appropriate description also of experienced utility.

prohibited. A type L consumer purchases the fringe product online at $p_L^I = c_L$, and thus his utility is not affected by whether or not the branded product is also available on the internet.

In our simple model, where – on the equilibrium path – a type H consumer always buys the branded product and a type L consumer always buys the fringe product, the prices are welfare neutral transfers from consumers to firms. In other words, the price levels do not affect the volume of sales of the two products. In a richer model with elastic demand, higher prices translate into lower sales and also lower welfare. If this is the case, a prohibition of internet sales can be harmful to total welfare (sum of consumer and producer surplus). Nevertheless, whether or not internet sales are allowed has an impact on total welfare also in our model. From a welfare perspective, each consumer should purchase a good at a local store because consumers have a preference for shopping there rather than on the internet platform. If internet sales are prohibited, type L consumers purchase from the internet platform, leading to a welfare loss of δ. Hence, a ban on prohibiting internet sales is beneficial for total welfare as inefficient internet sales are avoided.

5. Extensions and Robustness

In several respects our model is highly stylized. In this section we discuss a few extensions and argue that our main findings are robust.

Endogenous quality and long-run welfare. We assumed that the quality levels of both the brand manufacturer and the fringe firms are given. In the real world, firms react to policy changes and – at least in the long-run – may decide to adjust a product's design, i.e. its quality. For the sake of the argument, suppose that the brand manufacturer – at the beginning of the game – can choose its quality $q_H \geq q_L$. We abstract from costs for R&D but assume that the per-unit production cost $c(q_H)$ depends positively on the produced quality; let $c'(q_H) > 0$ and $c''(q_H) > 0$. The welfare optimal quality level q^* maximizes $u_H^E - c(q_H)$ and thus is characterized by $c'(q^*) = 1$. Suppose that consumers have only a relatively weak preference for purchasing at a brick-and-mortar store. If the manufacturer is allowed to ban online sales, it will do so, quality is salient at the physical store, and the equilibrium wholesale price is $\hat{w}_Q - \delta$. In this case, the manufacturer has an incentive to produce a too high quality, $q_Q > q^*$, which is characterized by $1/\gamma = c'(q_Q)$. If it is prohibited to ban online sales, price is salient at the store and the equilibrium wholesale price is $\hat{w}_P$. In this case, the brand manufacturer produces a good of too low quality; $q_P < q^*$ with $\gamma = c'(q_P)$. Whether the welfare distortion is more severe in the former or the latter case depends on the precise functional form. For a quadratic cost function, $c(q_H) = q_H^2/2$, it can be shown that welfare is higher if distribution systems under which online sales are prohibited are banned.

Different degrees of preferences for purchasing at a brick-and-mortar store. We assumed that the willingness to pay in order to buy at a physical store rather than online is the same for both consumer types and for both products. This willingness to pay, however, might also be increasing in the quality of the good or might be (positively) correlated with a consumer's type. Suppose that it is less important to buy at a physical store if the product is of low quality. More precisely, the preference for purchasing quality q_i at a brick-and-mortar store is δ_i, with $\delta_H > \delta_L \geq 0$. The salience constraint (13) now becomes

$$\frac{q_H}{q_L} \geq \frac{w + \delta_H}{c_L + \delta_L}.$$

Thus, now it is "more likely" that, in setting its wholesale price, the brand manufacturer is restricted by salience. Moreover, compensating a retailer for not serving the type L consumer becomes cheaper. Hence, we conjecture that the brand manufacturer prefers to forbid online sales for an even broader set of parameters. Finally, note that a consumer type specific δ_Θ has similar effects because – on the equilibrium path – type H purchases the high-quality and type L the low-quality product.

Salience is determined by all goods available. Effectively, a consumer at the store contemplates about four options, purchasing (i) a fringe product at the store, (ii) a branded product at the store, (iii) a fringe product online, or (iv) a branded product online. We assumed that a consumer's reference good – which determines whether price or quality is the salient attribute – is the average of the products the consumer directly observes in a certain shopping situation. We believe that the directly available options affect a consumer's evaluation of the goods more than options that are not immediately available; i.e. at a brick-and-mortar store, the goods displayed there influence the consumer's decision more than goods he may also be able to purchase from an online platform. Nevertheless, it may also be the case for some products or consumers that the salience at the physical store is determined by all options the consumer has. If this is true, we still obtain that the general price level – the average of all four options – is low when both qualities are available online. The online prices highly restrict the store prices and thus all prices are relatively low. If internet sales of the branded product are prohibited, then there are only three options. A local retailer can set two of these three prices and thus may still be able to create high average prices so that quality is the salient attribute at the store (for the branded product).[27] Therefore, we conjecture that the main effects of salience we identified are robust towards assuming that all choice options determine the reference good.

Alternative models of relative thinking. Our modeling of context-dependent preferences builds on the ideas of the model of salient thinking by Bordalo, Gennaioli, and Shleifer (2013). Alternative theories are *focusing* (Kőszegi and Szeidl, 2013) and *relative thinking* (Bushong, Rabin, and Schwartzstein, 2016). In Kőszegi and Szeidl (2013), the weight put on an attribute, say quality, depends on the difference between the maximum quality and the minimum quality in the consideration set and the weight is increasing in this difference. If, at the local store, the salience weights are determined by the products available at the store, a similar reasoning for prohibiting online sales may arise. When the markup for the branded product is not determined by internet prices, a local retailer can charge similar prices for both products in order to reduce the weight on price and to increase the weight on quality. This allows him to charge a higher price from final consumers, which is also in the interest of the brand manufacturer. In the reduced-form model of Bushong, Rabin, and Schwartzstein (2016), the weight placed on a given attribute is also a function of the range of values of this attribute in the choice set. Here, in contrast, the weight is the higher the lower the differences in values are. With this formulation, it is harder to obtain effects similar to the ones we outlined in this paper.

6. Conclusion

We provide an explanation for a brand manufacturer's rationale to restrict online sales based on the assumption that a consumer's purchasing decision is distorted by salient thinking according to the theory of Bordalo, Gennaioli, and Shleifer (2013): On an online platform, there is severe competition and the price level is relatively low. Due to diminishing sensitivity, consumers focus more on price rather than quality in this low-price environment. Especially if consumers have only a mild preference for purchasing in the physical store instead of online, price tends to be salient also in the local store because

[27] With more than two products, salience is product specific. This implies that not necessarily the same attribute is salient for all products.

internet prices severely restrict a retailer in his price-setting in store. This, in turn, highly limits the wholesale price the brand manufacturer can charge. The manufacturer can try to circumvent this problem by prohibiting online sales of its product. If the branded product is not available online, internet prices are less critical for a retailer's price-setting in the local store. In particular, he can now charge a significant markup on the branded product. As the markup is higher if quality rather than price is salient, this creates an incentive for the retailer to make quality the salient attribute – which is also in the brand manufacturer's interest. In other words, prohibiting internet sales aligns a retailer's incentives regarding the salient attribute with the brand manufacturer's. We also show that, the weaker are consumers' preferences for purchasing in the physical store and the stronger is their salience bias, the more likely it is that a brand manufacturer wants to restrict online sales. Moreover, we find that banning distribution systems that prohibit internet sales leads to lower prices for final consumers and thus a higher consumer welfare. Additionally, a ban is also beneficial for total welfare because inefficient online sales are avoided. However, the welfare implications that can be drawn from our analysis are limited as, in our simple model, whether internet sales are prohibited or not has no impact on the total amount sold of either product. A deeper analysis of the welfare implications is beyond the scope of this paper and a fascinating topic for future research.

A. Proofs of Corollary and Propositions

Proof of Proposition 1. The proof follows from the arguments outlined in the main text. □

Proof of Proposition 2. To determine the manufacturer's optimal price-setting behavior, we first analyze which business strategy the retailer adopts for a given wholesale price. There are six potential business strategies the retailer can choose:

(I) sell both the branded and the fringe product, make quality salient (both, quality)

(II) sell both the branded and the fringe product, make price salient (both, price)

(III) sell only the branded product, make quality salient (high, quality)

(IV) sell only the branded product, make price salient (high, price)

(V) sell only the fringe product, make price salient (low, price)

(VI) sell only the fringe product, make quality salient (low, quality).

In the following, we calculate the profits for each strategy (I)-(VI).

(I) If the retailer wants to sell both products making quality salient, he solves the following profit maximization problem:

$$\max_{p_H^S, p_L^S} \quad (p_H^S - w) + (p_L^S - c_L)$$

subject to

$$\frac{1}{\gamma}q_L + \delta - p_L^S \geq \frac{1}{\gamma}q_L - c_L \tag{IR$_L$}$$
$$\frac{1}{\gamma}q_H + \delta - p_H^S \geq \frac{1}{\gamma}q_H - w \tag{IR$_H^1$}$$
$$\frac{1}{\gamma}q_H + \delta - p_H^S \geq \frac{1}{\gamma}q_L + \delta - p_L^S \tag{IR$_H^2$}$$
$$\frac{1}{\gamma}q_H + \delta - p_H^S \geq \frac{1}{\gamma}q_L - c_L \tag{IR$_H^3$}$$
$$\frac{q_H}{q_L} \geq \frac{p_H^S}{p_L^S}. \tag{SC$_Q$}$$

Conditions (IR$_L$) and (IR$_H^1$) make sure that both the type L and the type H consumer purchase in the store instead of online. (IR$_H^2$) and (IR$_H^3$) have to be fulfilled to make type H purchase the branded good instead of the low-quality product. Note that (IR$_H^3$) is fulfilled if (IR$_L$) and (IR$_H^2$) are fulfilled, i.e. we can ignore it in the following. The salience constraint (SC$_Q$) ensures that quality is indeed the salient attribute. It is important to note that (IR$_L$) and (IR$_H^1$) define upper bounds for the prices in the store depending on online prices: as both products are available on the online platform, the retailer can never set prices p_L^S and p_H^S in the store higher than $c_L + \delta$ and $w + \delta$, respectively. This implies that the maximum profit a retailer can possibly make (with any strategy) is $\pi = 2\delta$.

It is optimal to set p_L^S as high as possible, $p_L^S = c_L + \delta$, as (IR$_H^2$) and (SC$_Q$) are easier to fulfil if p_L^S is high. Inserting $p_L^S = c_L + \delta$, we get

$$p_H^S \leq \frac{1}{\gamma}(q_H - q_L) + c_L + \delta \tag{IR$_H^2$}$$

$$p_H^S \leq (c_L + \delta)\frac{q_H}{q_L}. \tag{SC$_Q$}$$

The optimal price for the branded good depends on which of the constraints (IR$_H^1$), (IR$_H^2$) and (SC$_Q$) sets the most restrictive upper bound on p_H^S.

(IR_H^1) is more restrictive than (IR_H^2) if

$$w + \delta \leq c_L + \delta + \frac{1}{\gamma}(q_H - q_L)$$
$$\iff w \leq \frac{1}{\gamma}(q_H - q_L) + c_L \equiv \hat{w}_Q. \tag{A.20}$$

(IR_H^1) is more restrictive than (SC_Q) if

$$w + \delta \leq (c_L + \delta)\frac{q_H}{q_L}$$
$$\iff w \leq \frac{q_H}{q_L}c_L + \frac{q_H - q_L}{q_L}\delta \equiv \tilde{w}. \tag{A.21}$$

(SC_Q) is more restrictive than (IR_H^2) if

$$(c_L + \delta)\frac{q_H}{q_L} < c_L + \delta + \frac{1}{\gamma}(q_H - q_L)$$
$$\iff \delta < \frac{1}{\gamma}q_L - c_L. \tag{A.22}$$

Correspondingly, the retailer must distinguish the following three cases:

(i): $w \leq \min\{\hat{w}_Q, \tilde{w}\}$

In this case, (IR_H^1) is binding and the retailer sets $p_L^S = c_L + \delta$ and $p_H^S = w + \delta$. The corresponding profit is $\pi(\text{both, quality}) = 2\delta$.

(ii) $w > \hat{w}_Q$ and $\delta \geq \frac{1}{\gamma}q_L - c_L$

(IR_H^2) is binding and the retailer sets $p_L^S = c_L + \delta$ and $p_H^S = \frac{1}{\gamma}(q_H - q_L) + c_L + \delta$. The corresponding profit is $\pi(\text{both, quality}) = \delta + \frac{1}{\gamma}(q_H - q_L) + c_L + \delta - w < 2\delta$, as $w > \hat{w}$.

(iii) $w > \tilde{w}$ and $\delta < \frac{1}{\gamma}q_L - c_L$

(SC_Q) is binding and the retailer sets $p_L^S = c_L + \delta$ and $p_H^S = \frac{q_H}{q_L}(c_L + \delta)$. The corresponding profit is $\pi(\text{high, quality}) = \delta + \frac{q_H}{q_L}(c_L + \delta) - w < 2\delta$, as $w > \tilde{w}$.

(II) If the retailer decides to sell both qualities and make price salient, he solves the following maximization problem:

$$\max_{p_H^S, p_L^S} \quad (p_L^S - c_L) + (p_H^S - w)$$

subject to

$$\gamma q_L + \delta - p_L^S \geq \gamma q_L - c_L \qquad (\text{IR}_L)$$

$$\gamma q_H + \delta - p_H^S \geq \gamma q_H - w \qquad (\text{IR}_H^1)$$

$$\gamma q_H + \delta - p_H^S \geq \gamma q_L + \delta - p_L^S \qquad (\text{IR}_H^2)$$

$$\gamma q_H + \delta - p_H^S \geq \gamma q_L - c_L \qquad (\text{IR}_H^3)$$

$$\frac{q_H}{q_L} < \frac{p_H^S}{p_L^S} \qquad (\text{SC}_P)$$

Again, as (IR_H^3) is fulfilled if (IR_L) is satisfied, we can ignore it. p_L^S and p_H^S are bounded from above by (IR_L) and (SC_P), and (IR_H^1) and (IR_H^2), respectively. Thus, we have to distinguish four cases:

(i) (IR_L) and (IR_H^1) are binding

The retailer sets $p_L^S = c_L + \delta$ and $p_H^S = w + \delta$. The corresponding profit is $\pi(\text{both, price}) = 2\delta$. At these prices, ($\text{IR}_H^2$) is satisfied if

$$\begin{aligned} &\gamma q_H + \delta - (w + \delta) \geq \gamma q_L + \delta - (c_L + \delta) \\ &\iff w \leq \gamma(q_H - q_L) + c_L \equiv \hat{w}_P. \end{aligned} \qquad (\text{A.23})$$

(SC_P) is satisfied if

$$\begin{aligned} &\frac{q_H}{q_L} < \frac{w + \delta}{c_L + \delta} \\ &\iff w > \frac{q_H}{q_L} c_L + \frac{q_H - q_L}{q_L} \delta \equiv \tilde{w}. \end{aligned} \qquad (\text{A.24})$$

This case, $\widetilde{w} < w \leq \hat{w}_P$, exists only if

$$\begin{aligned} &\frac{q_H}{q_L} c_L + \frac{q_H - q_L}{q_L} \delta < \gamma(q_H - q_L) + c_L \\ &\iff \delta < \gamma q_L - c_L. \end{aligned} \qquad (\text{A.25})$$

(ii) (IR_L) and (IR_H^2) are binding.

The retailer sets $p_L^S = c_L + \delta$ and $p_H^S = \gamma(q_H - q_L) + c_L + \delta$. At these prices, ($\text{IR}_H^1$) is satisfied if

$$\begin{aligned} &\gamma q_H + \delta - [\gamma(q_H - q_L) + c_L + \delta] \geq \gamma q_H - w \\ &\iff w \geq \gamma(q_H - q_L) + c_L \equiv \hat{w}_P. \end{aligned} \qquad (\text{A.26})$$

(SC_P) is fulfilled if

$$\begin{aligned} &\frac{q_H}{q_L} < \frac{\gamma(q_H - q_L) + c_L + \delta}{c_L + \delta} \\ &\iff \delta < \gamma q_L - c_L. \end{aligned} \qquad (\text{A.27})$$

As in this case, this business strategy is only feasible if $w \geq \hat{w}_P$, the retailer's profit $\pi(\text{both, price}) = \delta + \gamma(q_H - q_L) + c_L + \delta - w \leq 2\delta$.

(iii) (IR_H^1) and (SC_P) are binding.

The retailer sets $p_H^S = w + \delta$ and $p_L^S = \frac{q_L}{q_H}(w + \delta)$. Strictly speaking, if the salience constraint is satisfied with equality, then quality is salient. We allow here for price being salient even if the constraint holds with equality in order to cleanly characterize the cases where the retailer wants to create a price salient environment. It is important to note, however, that if the constraint holds with equality, the retailer can also create a quality salient environment and – all else equal – a quality salient environment is always (weakly) preferred to a price salient one. Thus, if in the overall optimal retailer strategy price is salient, the salience constraint is satisfied with strict inequality.

At the above prices, (IR_L) is satisfied if

$$\begin{aligned} \gamma q_L + \delta - \frac{q_L}{q_H}(w + \delta) &\geq \gamma q_L - c_L \\ \iff w &\leq \frac{q_H}{q_L} c_L + \frac{q_H - q_L}{q_L}\delta \equiv \tilde{w}. \end{aligned} \tag{A.28}$$

(IR_H^2) is fulfilled if

$$\begin{aligned} \gamma q_H + \delta - (w + \delta) &\geq \gamma q_L + \delta - \frac{q_L}{q_H}(w + \delta) \\ \iff w &\leq \gamma q_H - \delta. \end{aligned} \tag{A.29}$$

The corresponding profit in this case is $\pi(\text{both, price}) = w + \delta - w + \frac{q_L}{q_H}(w + \delta) - c_L < 2\delta$, as, for a solution to exist, w has to be smaller than $\tilde{w}$.

(iv) (IR_H^2) and (SC_P) are binding.

The retailer sets

$$\begin{aligned} p_H^S &= \gamma(q_H - q_L) + p_H^S \frac{q_L}{q_H} \\ \iff p_H^S &= \gamma q_H \end{aligned} \tag{A.30}$$

and $p_L^S = \gamma q_L$.

(IR_L) is satisfied if $\gamma q_L \leq c_L + \delta$ and (IR_H^1) is satisfied if $\gamma q_H \leq w + \delta$. Therefore, the corresponding profit is $\pi(\text{both, price}) = \gamma q_L - c_L + \gamma q_H - w < 2\delta$.

(III) If the retailer sells only the branded good to the type H consumer and makes quality salient, he solves the following maximization problem:

$$\max_{p_H^S, p_L^S} \quad (p_H^S - w)$$

subject to

$$\frac{1}{\gamma}q_H + \delta - p_H^S \geq \frac{1}{\gamma}q_H - w \quad (\text{IR}_H^1)$$

$$\frac{1}{\gamma}q_H + \delta - p_H^S \geq \frac{1}{\gamma}q_L + \delta - p_L^S \quad (\text{IR}_H^2)$$

$$\frac{1}{\gamma}q_H + \delta - p_H^S \geq \frac{1}{\gamma}q_L - c_L \quad (\text{IR}_H^3)$$

$$\frac{q_H}{q_L} \geq \frac{p_H^S}{p_L^S}. \quad (\text{SC}_Q)$$

It is optimal to set p_L^S prohibitively high, e.g. $p_L^S = p_H^S$, to fulfil (IR_H^2) and the salience constraint. The price for the branded good is then bounded from above by (IR_H^1) or (IR_H^3), i.e. we have to distinguish two cases:

(i) $w \leq \hat{w}_Q$

(IR_H^1) is binding. The retailer sets $p_H^S = w + \delta$ and $p_L^S = p_H^S$. Only the type H consumer purchases in the store. The retailer's profit is $\pi(\text{high, quality}) = \delta$.

(ii) $w > \hat{w}_Q$

(IR_H^3) is binding. The retailer sets $p_H^S = \frac{1}{\gamma}(q_H - q_L) + c_L + \delta$ and $p_L^S = p_H^S$. Only the type H consumer purchases in the store. The retailer's profit is $\pi(\text{high, quality}) = \frac{1}{\gamma}(q_H - q_L) + c_L + \delta - w < \delta$ as $w > \hat{w}_Q$.

(IV) The retailer solves the following maximization problem:

$$\max_{p_H^S, p_L^S} \quad (p_H^S - w)$$

subject to

$$\gamma q_H + \delta - p_H^S \geq \gamma q_H - w \quad (\text{IR}_H^1)$$

$$\gamma q_H + \delta - p_H^S \geq \gamma q_L + \delta - p_L^S \quad (\text{IR}_H^2)$$

$$\gamma q_H + \delta - p_H^S \geq \gamma q_L - c_L \quad (\text{IR}_H^3)$$

$$\frac{q_H}{q_L} < \frac{p_H^S}{p_L^S}. \quad (\text{SC}_P)$$

It is easy to see that this business strategy is dominated by strategy (III): Firstly, if the retailer makes quality salient, he can charge a higher mark-up on the high-quality product relative to the low-quality product as the quality difference is perceived to be higher (see the respective constraints (IR_H^2) and (IR_H^3)). Secondly, if the retailer makes quality salient, the salience constraint is easily fulfilled by setting p_L^S high, whereas it might be binding if he wants to make price salient. Therefore, if the retailer wants to sell only the branded good, it is optimal to make quality the salient attribute.

(V) The retailer's maximization problem is:

$$\max_{p_H^S, p_L^S} \quad (p_L^S - c_L)$$

subject to

$$\gamma q_L + \delta - p_L^S \geq \gamma q_L - c_L \tag{IR$_L$}$$

$$\gamma q_L + \delta - p_L^S \geq \gamma q_H - w \tag{IR$_H^1$}$$

$$\gamma q_L + \delta - p_L^S \geq \gamma q_H + \delta - p_H^S \tag{IR$_H^2$}$$

$$\frac{q_H}{q_L} < \frac{p_H^S}{p_L^S}. \tag{SC$_P$}$$

It is optimal to set p_H^S prohibitively high to make price salient and to fulfil (IR$_H^2$). Of the two remaining constraints, (IR$_H^1$) sets the more restrictive upper bound on p_L^S if

$$\begin{aligned} &\gamma q_H - w \geq \gamma q_L - c_L \\ \iff &w \leq \gamma(q_H - q_L) + c_L \equiv \hat{w}_P. \end{aligned} \tag{A.31}$$

Thus, we have to distinguish two cases:

(i) $w \leq \hat{w}_P$

(IR$_H^1$) is binding and the retailer sets $p_L^S = w + \delta - \gamma(q_H - q_L)$ and p_H^S prohibitively high. The corresponding profit is $\pi(\text{low, price}) = 2(w + \delta - \gamma(q_H - q_L) - c_L) < 2\delta$ as $w \leq \hat{w}_P$ in this case.

(ii) $w > \hat{w}_P$

The retailer sets $p_L^S = c_L + \delta$ and p_H^S prohibitively high. The corresponding profit is $\pi(\text{low, price}) = 2\delta$.

(VI) The retailer's maximization problem is:

$$\max_{p_H^S, p_L^S} \quad (p_L^S - c_L)$$

subject to

$$\frac{1}{\gamma}q_L + \delta - p_L^S \geq \frac{1}{\gamma}q_L - c_L \tag{IR$_L$}$$

$$\frac{1}{\gamma}q_L + \delta - p_L^S \geq \frac{1}{\gamma}q_H - w \tag{IR$_H^1$}$$

$$\frac{1}{\gamma}q_L + \delta - p_L^S \geq \frac{1}{\gamma}q_H + \delta - p_H^S \tag{IR$_H^2$}$$

$$\frac{q_H}{q_L} \geq \frac{p_H^S}{p_L^S}. \tag{SC$_Q$}$$

It is easy to see that this business strategy is dominated by strategy (V): Fistly, the respective constraints (IR$_H^1$) and (IR$_H^2$) are less restrictive if price is salient instead of quality. Secondly, if the retailer wants to make price salient, the salience constraint is easily fulfilled by setting p_H^S high, whereas it might be binding if quality is supposed to be salient. Therefore, if the retailer wants to sell only the low-quality product, it is optimal to make price the salient attribute.

Now that we have derived the profits under all possible business strategies, we can determine the retailer's optimal strategy. Remember that the highest possible profit a retailer can make is $\pi = 2\delta$. Note that this is never feasible by selling only the branded good. We now want to show that for every wholesale price, there exist a business strategy that allows the retailer to make a profit of $\pi = 2\delta$. The retailer can earn 2δ with business strategy

$$\text{(both, quality)} \quad \text{if} \quad w \leq \min\{\hat{w}_Q, \tilde{w}\} \tag{A.32}$$

$$\text{(both, price)} \quad \text{if} \quad \tilde{w} < w \leq \hat{w}_P \quad \text{and} \quad \delta < \gamma q_L - c_L \tag{A.33}$$

$$\text{(low, price)} \quad \text{if} \quad w > \hat{w}_P. \tag{A.34}$$

For the respective limit wholesale prices we have that $\hat{w}_Q > \hat{w}_P \iff \frac{1}{\gamma}(q_H - q_L) + c_L > \gamma(q_H - q_L) + c_L$, as $\gamma < 1$. Next, $\tilde{w} < \hat{w}_P$, if

$$\begin{aligned} \frac{q_H}{q_L}c_L + \frac{q_H - q_L}{q_L}\delta &< \gamma(q_H - q_L) + c_L \\ \iff \delta &< \gamma q_L - c_L, \end{aligned} \tag{A.35}$$

and $\tilde{w} < \hat{w}_Q$, if

$$\begin{aligned} \frac{q_H}{q_L}c_L + \frac{q_H - q_L}{q_L}\delta &< \frac{1}{\gamma}(q_H - q_L) + c_L \\ \iff \delta &< \frac{1}{\gamma}q_L - c_L. \end{aligned} \tag{A.36}$$

Now, we can state our main result. Depending on δ, we must distinguish three cases (see Proposition 2). For each case, we find the retailer's optimal business strategy and derive the manufacturer's optimal wholesale price.[28] The manufacturer always chooses the highest wholesale price that makes it still optimal for the retailer to offer the branded good.

(I) If $\delta < \gamma q_L - c_L$, i.e. for a weak preference of the consumers to purchase at a local store, $\tilde{w} < \hat{w}_P$. The retailer chooses business strategy

$$\begin{aligned} &\text{(both, quality)} \quad \text{if} \quad w \leq \tilde{w} \quad \text{or} \\ &\text{(both, price)} \quad \text{if} \quad \tilde{w} < w \leq \hat{w}_P \quad \text{or} \\ &\text{(low, price)} \quad \text{if} \quad w > \hat{w}_P. \end{aligned} \tag{A.37}$$

Therefore, the manufacturer sets $w^F = \hat{w}_P$.

(II) If $\gamma q_L - c_L \leq \delta < \frac{1}{\gamma} q_L - c_L$, i.e. for an intermediate preference of the consumers to purchase at a local store, $\hat{w}_P \leq \tilde{w} < \hat{w}_Q$. The retailer chooses business strategy

$$\begin{aligned} &\text{(both, quality)} \quad \text{if} \quad w \leq \tilde{w} \quad \text{or} \\ &\text{(low, price)} \quad \text{if} \quad w > \hat{w}_P. \end{aligned} \tag{A.38}$$

Therefore, the manufacturer sets $w^F = \tilde{w}$.

(III) If $\delta \geq \frac{1}{\gamma} q_L - c_L$, i.e. for a strong preference of the consumers to purchase at a local store, $\tilde{w} \geq \hat{w}_Q$. The retailer chooses business strategy

$$\begin{aligned} &\text{(both, quality)} \quad \text{if} \quad w \leq \hat{w}_Q \quad \text{or} \\ &\text{(low, price)} \quad \text{if} \quad w > \hat{w}_P. \end{aligned} \tag{A.39}$$

Therefore, the manufacturer sets $w^F = \hat{w}_Q$.

□

Proof of Proposition 3. For the manufacturer, the optimal wholesale price is the highest wholesale price that makes selling the branded good an attractive business strategy for the retailer. This implies that, as the retailer can always ensure himself a profit of $\pi = 2\delta$ by selling only the low-quality product at a price $p_L^S = c_L + \delta$ (and with p_H^S prohibitively high), the wholesale price must allow the retailer to make a profit of $\pi \geq 2\delta$ when selling the branded product. There are four possible business strategies for selling the branded product:

[28] Remember that we assume that, if the retailer is indifferent between selling both products and selling only the fringe product, he offers both products.

(I) sell both the branded and the fringe product, make quality salient (both, quality)

(II) sell both the branded and the fringe product, make price salient (both, price)

(III) sell only the branded product, make quality salient (high, quality)

(IV) sell only the branded product, make price salient (high, price).

Note that (III) and (IV), i.e. selling only the high-quality product to consumer H, are also potentially attractive business strategies now: As the high-quality good is not available on the online platform, the retailer is not directly restricted by online prices, i.e. in principle, he is able to charge a margin higher than δ on the branded good.

In the following, we calculate the profits for each strategy (I)-(IV).

(I) If the retailer wants to sell both products making quality salient, he solves the following profit maximization problem:

$$\max_{p_H^S, p_L^S} \quad (p_H^S - w) + (p_L^S - c_L)$$

subject to

$$\frac{1}{\gamma} q_L + \delta - p_L^S \geq \frac{1}{\gamma} q_L - c_L \tag{IR$_L$}$$

$$\frac{1}{\gamma} q_H + \delta - p_H^S \geq \frac{1}{\gamma} q_L + \delta - p_L^S \tag{IR$_H$}$$

$$\frac{q_H}{q_L} \geq \frac{p_H^S}{p_L^S} \tag{SC$_Q$}$$

First, note that it is optimal to set p_L^S as high as possible, i.e. $p_L^S = c_L + \delta$, because (SC$_Q$) is easier to fulfil if p_L^S is high. With $p_L^S = c_L + \delta$, the two constraints on p_H^S become

$$\frac{1}{\gamma}(q_H - q_L) + c_L + \delta \geq p_H^S \tag{IR$_H$}$$

$$c_L \frac{q_H}{q_L} + \delta \frac{q_H}{q_L} \geq p_H^S, \tag{SC$_Q$}$$

i.e. both set an upper bound on p_H^S. Constraint (IR$_H$) sets the more restrictive upper bound on p_H^S if

$$\frac{1}{\gamma}(q_H - q_L) + c_L + \delta \leq c_L \frac{q_H}{q_L} + \delta \frac{q_H}{q_L}$$

$$\iff \delta \geq \frac{1}{\gamma} q_L - c_L.$$

Correspondingly, we have to distinguish two cases:

(i): $\delta \geq \frac{1}{\gamma} q_L - c_L$

(IR$_H$) is binding and the optimal prices in the store are $p_L^S = c_L + \delta$ and $p_H^S = \frac{1}{\gamma}(q_H - q_L) + c_L + \delta$. The corresponding profit is $\pi(\text{both, quality}) = 2\delta + \frac{1}{\gamma}(q_H - q_L) + c_L - w$.

(ii): $\delta < \frac{1}{\gamma} q_L - c_L$

(SC$_Q$) is binding and the optimal prices are $p_L^S = c_L + \delta$ and $p_H^S = (c_L + \delta)\frac{q_H}{q_L}$. The corresponding profit is $\pi(\text{both, quality}) = \delta + (c_L + \delta)\frac{q_H}{q_L} - w$.

Thus, the profit from business strategy (I) is

$$\pi(\text{both, quality}) = \begin{cases} 2\delta + \frac{1}{\gamma}(q_H - q_L) + c_L - w & \text{if} \quad \delta \geq \frac{1}{\gamma} q_L - c_L \\ \delta + \frac{q_H}{q_L}(c_L + \delta) - w & \text{if} \quad \delta < \frac{1}{\gamma} q_L - c_L. \end{cases}$$

(II) The retailer's profit maximization problem is

$$\max_{p_H^S, p_L^S} \quad (p_H^S - w) + (p_L^S - c_L)$$

subject to

$$\gamma q_L + \delta - p_L^S \geq \gamma q_L - c_L \qquad (\text{IR}_L)$$

$$\gamma q_H + \delta - p_H^S \geq \gamma q_L + \delta - p_L^S \qquad (\text{IR}_H)$$

$$\frac{q_H}{q_L} < \frac{p_H^S}{p_L^S}. \qquad (\text{SC}_P)$$

Note that both (IR$_L$) and (SC$_P$) set an upper bound on p_L^S. Thus, only (IR$_H$) and (IR$_L$) or (IR$_H$) and (SC$_P$) can be binding at the same time. Correspondingly, we have to distinguish two cases:

(i): (IR$_H$) and (IR$_L$) are binding.

The optimal prices are $p_L^S = c_L + \delta$ and $p_H^S = \gamma(q_H - q_L) + c_L + \delta$. At these prices, the salience constraint is satisfied only if $\delta < \gamma q_L - c_L$. The corresponding profit is $\pi(\text{both, price}) = 2\delta + \gamma(q_H - q_L) + c_L - w$.

(ii): (IR$_H$) and (SC$_P$) are binding.

If p_L^S is chosen so that the salience constraint is just fulfilled, i.e. $p_L^S = p_H^S \frac{q_L}{q_H}$, then (IR$_H$) becomes $p_H^S \leq \gamma(q_H - q_L) + p_H^S \frac{q_L}{q_H}$. This yields the optimal prices $p_H^S = \gamma q_H$ and (after reinserting into the salience constraint) $p_L^S = \gamma q_L$. At these prices, constraint (IR$_L$) is satisfied only if $\delta \geq \gamma q_L - c_L$. The corresponding profit is $\pi(\text{both, price}) = \gamma q_H + \gamma q_L - c_L - w$.

Thus, the profit from business strategy (II) is

$$\pi(\text{both, price}) = \begin{cases} \gamma q_L - c_L + \gamma q_H - w & \text{if} \quad \delta \geq \gamma q_L - c_L \\ 2\delta + \gamma(q_H - q_L) + c_L - w & \text{if} \quad \delta < \gamma q_L - c_L. \end{cases} \tag{A.40}$$

(III) The retailer's maximization problem is

$$\max_{p_H^S, p_L^S} \quad p_H^S - w$$

subject to

$$\frac{1}{\gamma} q_H + \delta - p_H^S \geq \frac{1}{\gamma} q_L + \delta - p_L^S \tag{IR$_H^1$}$$

$$\frac{1}{\gamma} q_H + \delta - p_H^S \geq \frac{1}{\gamma} q_L - c_L \tag{IR$_H^2$}$$

$$\frac{q_H}{q_L} \geq \frac{p_H^S}{p_L^S} \tag{SC$_Q$}$$

It is optimal to set p_L^S prohibitively high, e.g. $p_L^S = p_H^S$, to fulfil (SC$_Q$) and (IR$_H^1$). From (IR$_H^2$), we get the optimal price for the branded good: $p_H^S = \frac{1}{\gamma}(q_H - q_L) + c_L + \delta$. The corresponding profit is $\pi(\text{high, quality}) = \frac{1}{\gamma}(q_H - q_L) + c_L + \delta - w$.

(IV) The retailer's maximization problem is

$$\max_{p_H^S, p_L^S} \quad p_H^S - w$$

subject to

$$\gamma q_H + \delta - p_H^S \geq \gamma q_L + \delta - p_L^S \tag{IR$_H^1$}$$

$$\gamma q_H + \delta - p_H^S \geq \gamma q_L - c_L \tag{IR$_H^2$}$$

$$\frac{q_H}{q_L} < \frac{p_H^S}{p_L^S} \tag{SC$_Q$}$$

Note that by (IR$_H^1$), the price of the branded good is restricted to $p_H^S \leq \gamma(q_H - q_L) + c_L + \delta < \frac{1}{\gamma}(q_H - q_L) + c_L + \delta$, i.e. the maximum price a retailer can charge is strictly smaller than the maximum price with business strategy (III). Thus, business strategy (IV) is dominated by business strategy (III); if the retailer wants to sell only the high-quality good to the type H consumer, it is optimal to make quality the salient attribute.

In order to find the retailer's optimal business strategy, we now analyze which of the remaining strategies, i.e. business strategies (I)-(III) for selling the branded good, or selling only the low-quality product (business strategy (low, price)), leads to the highest profit for a given wholesale price. From these results, we can directly derive the manufacturer's optimal wholesale price.

Depending on δ, we distinguish the three cases of Proposition 3:

(i) Let consumers' preference to purchase at a local store be weak, $\delta < \gamma q_L - c_L$.

The retailer prefers business strategy (II), i.e. selling both qualities and make price salient, to strategy (I), where quality is salient, if

$$\begin{aligned} &\pi(\text{both, price}) > \pi(\text{both, quality}) \\ \iff & 2\delta + \gamma(q_H - q_L) + c_L - w > \delta + \frac{q_H}{q_L}(c_L + \delta) - w \\ \iff & \delta < \gamma q_L - c_L, \end{aligned}$$

which holds in this case.

It is optimal for the retailer to sell only the branded good instead of offering both products if

$$\begin{aligned} &\pi(\text{high, quality}) > \pi(\text{both, price}) \\ \iff & \frac{1}{\gamma}(q_H - q_L) + c_L + \delta - w > 2\delta + \gamma(q_H - q_L) + c_L - w \\ \iff & \delta < \frac{1-\gamma^2}{\gamma}(q_H - q_L). \end{aligned}$$

We can now state our first result:

If $\delta < \min\left\{\frac{1-\gamma^2}{\gamma}(q_H - q_L), \gamma q_L - c_L\right\}$, the retailer's optimal business strategy is to sell the branded good only, if $\pi(\text{high, quality}) \geq \pi(\text{low, price})$, i.e. if

$$\begin{aligned} &\frac{1}{\gamma}(q_H - q_L) + c_L + \delta - w \geq 2\delta \\ \iff & w \leq \frac{1}{\gamma}(q_H - q_L) + c_L - \delta = \hat{w}_Q - \delta, \end{aligned} \tag{A.41}$$

and to sell only the low-quality good if $w > \hat{w}_Q - \delta$.

The manufacturer sets $w^R = \hat{w}_Q - \delta$.

If $\frac{1-\gamma^2}{\gamma}(q_H - q_L) \leq \delta < \gamma q_L - c_L$, the retailer's optimal business strategy is to sell both goods and make price salient, if $\pi(\text{both, price}) \geq \pi(\text{low, price})$, i.e. if

$$\begin{aligned} & 2\delta + \gamma(q_H - q_L) + c_L - w \geq 2\delta \\ & \qquad\qquad \iff w \leq \gamma(q_H - q_L) + c_L \equiv \hat{w}_P, \end{aligned} \tag{A.42}$$

and to sell only the low-quality good if $w > \hat{w}_P$.

The manufacturer sets the highest wholesale price that leaves the retailer just indifferent between the two strategies (in which case we assume that he prefers to offer both goods), i.e. $w^R = \hat{w}_P$.

This case, $\frac{1-\gamma^2}{\gamma}(q_H - q_L) \leq \delta < \gamma q_L - c_L$, exists only if

$$\begin{aligned} & \frac{1-\gamma^2}{\gamma}(q_H - q_L) < \gamma q_L - c_L \\ \iff & (1-\gamma^2) q_H < q_L - \gamma c_L. \end{aligned} \tag{A.43}$$

(ii) Let consumers' preference to purchase at a local store be intermediate, $\gamma q_L - c_L \leq \delta < \frac{1}{\gamma} q_L - c_L$.

The retailer prefers business strategy (I) to business strategy (II), if

$$\begin{aligned} & \pi(\text{both, quality}) \geq \pi(\text{both, price}) \\ & \delta + \frac{q_H}{q_L}(c_L + \delta) - w \geq \gamma q_L - c_L + \gamma q_H - w \\ & \qquad \iff \delta \geq \gamma q_L - c_L, \end{aligned} \tag{A.44}$$

which holds in this case.

The retailer indeed prefers to offer both products instead of only the branded good if

$$\begin{aligned} & \pi(\text{both, quality}) \geq \pi(\text{high,quality}) \\ & \delta + \frac{q_H}{q_L}(c_L + \delta) - w \geq \frac{1}{\gamma}(q_H - q_L) + c_L + \delta - w \\ & \qquad \iff \delta \geq \left(\frac{1}{\gamma} q_L - c_L\right)\left(\frac{q_H - q_L}{q_H}\right). \end{aligned} \tag{A.45}$$

We can now state our next result:

If $\gamma q_L - c_L \leq \delta < \left(\frac{1}{\gamma} q_L - c_L\right)\left(\frac{q_H - q_L}{q_H}\right)$, the retailer's optimal business strategy is to sell only the branded good, if $\pi(\text{high, quality}) \geq \pi(\text{low, price})$, i.e. if

$$\begin{aligned} & \frac{1}{\gamma}(q_H - q_L) + c_L + \delta - w \geq 2\delta \\ & \qquad\qquad w \leq \frac{1}{\gamma}(q_H - q_L) + c_L - \delta = \hat{w}_Q - \delta. \end{aligned} \tag{A.46}$$

The manufacturer sets $w^R = \hat{w}_Q - \delta$.

This case, $\gamma q_L - c_L \leq \delta < \left(\frac{1}{\gamma} q_L - c_L\right)\left(\frac{q_H - q_L}{q_H}\right)$, exists only if

$$\begin{aligned} \gamma q_L - c_L &< \left(\frac{1}{\gamma} q_L - c_L\right)\left(\frac{q_H - q_L}{q_L}\right) \\ \iff (1-\gamma^2) q_H &> q_L - \gamma c_L. \end{aligned} \tag{A.47}$$

If $\max\left\{\gamma q_L - c_L, \left(\frac{1}{\gamma} q_L - c_L\right)\left(\frac{q_H - q_L}{q_H}\right)\right\} \leq \delta < \frac{1}{\gamma} q_L - c_L$, the retailer's optimal business strategy is to sell both the high- and the low-quality product and make quality salient, if $\pi(\text{both, quality}) \geq \pi(\text{low, price})$, i.e. if

$$\begin{aligned} \delta + \frac{q_H}{q_L}(c_L + \delta) - w &\geq 2\delta \\ \iff w &\leq \frac{q_H}{q_L} c_L + \frac{q_H - q_L}{q_L}\delta \equiv \tilde{w}, \end{aligned} \tag{A.48}$$

and to sell only the low-quality good if $w > \tilde{w}$.

The manufacturer sets $w^R = \tilde{w}$.

(iii) Let consumers' preference to purchase at a local store be strong, $\delta \geq \frac{1}{\gamma} q_L - c_L$.

If the retailer offers both products, it is optimal to make quality the salient attribute if

$$\begin{aligned} \pi(\text{both, quality}) &\geq \pi(\text{both, price}) \\ 2\delta + \frac{1}{\gamma}(q_H - q_L) + c_L - w &\geq \gamma q_L - c_L + \gamma q_H - w \\ \iff 2(c_L + \delta) &\geq q_L(\gamma + \frac{1}{\gamma}) - q_H(\frac{1}{\gamma} - \gamma). \end{aligned} \tag{A.49}$$

The above condition is hardest to fulfil if the right hand side is large. This is the case for $q_H \to q_L$. With $q_H = q_L$, the condition becomes $\delta \geq \gamma q_L - c_L$, which is fulfilled in this case.

It is obvious that also $\pi(\text{both, quality}) > \pi(\text{high, quality})$.

Thus, we can conclude our proof with the following result:

If $\delta \geq \frac{1}{\gamma} q_L - c_L$, the retailer's optimal business strategy is to sell both the high- and the low-quality product and make quality salient, if $\pi(\text{both, quality}) \geq \pi(\text{low, price})$, i.e. if

$$\begin{aligned} 2\delta + \frac{1}{\gamma}(q_H - q_L) + c_L - w &\geq 2\delta \\ \iff w &\leq \frac{1}{\gamma}(q_H - q_L) + c_L \equiv \hat{w}_Q, \end{aligned} \tag{A.50}$$

and and to sell only the low-quality good if $w > \hat{w}_Q$.

The manufacturer sets $w^R = \hat{w}_Q$. □

Proof of Proposition 4. First, suppose that $(1-\gamma^2)q_H < q_L - \gamma c_L$; i.e., condition (19) holds. We distinguish four cases, depending on the size of δ.

(i) For $\delta \geq q_L/\gamma - c_L$, the highest wholesale price the manufacturer can charge if internet sales are allowed is $w^F = \hat{w}_Q$ (see Proposition 2). If internet sales are prohibited, the manufacturer charges $w^R = \hat{w}_Q$ (see Proposition 3). Thus, there is no rationale for the manufacturer to restrict online sales.

(ii) For $\gamma q_L - c_L \leq \delta < q_L/\gamma - c_L$, the highest wholesale price the manufacturer can charge under both distribution systems makes quality just salient, i.e. $w^F = w^R = \tilde{w}$. Again, there is no reason for the manufacturer to restrict online sales.

(iii) For $(1-\gamma^2)(q_H - q_L)/\gamma \leq \delta < \gamma q_L - c_L$, price is salient in equilibrium under both distribution systems. The maximal wholesale price the manufacturer can charge is thus independent of the distribution system and given by $w^F = w^R = \hat{w}_P$. The manufacturer has no incentive to ban online sales.

(iv) For $\delta < (1-\gamma^2)(q_H - q_L)/\gamma$, the maximal wholesale price if internet sales are allowed is $w^F = \hat{w}_P$. If internet sales are prohibited, the manufacturer charges $w^R = \hat{w}_Q - \delta$. The manufacturer strictly prefers to prohibit internet sales if

$$\hat{w}_Q - \delta > \hat{w}_P \tag{A.51}$$

$$\iff \frac{1}{\gamma}(q_H - q_L) + c_L - \delta > \gamma(q_H - q_L) + c_L \tag{A.52}$$

$$\iff \frac{1-\gamma^2}{\gamma}(q_H - q_L) > \delta, \tag{A.53}$$

which holds true in case (iv).

Secondly, suppose that $(1-\gamma^2)q_H \geq q_L - \gamma c_L$, i.e. condition (19) is violated. Again, we distinguish four cases.

(i) For $\delta \geq q_L/\gamma - c_L$, the highest wholesale price under both distribution systems is $w^F = w^R = \hat{w}_Q$.

(ii) For $(q_L/\gamma - c_L)(q_H - q_L)/q_H \leq \delta < q_L/\gamma - c_L$, the maximal wholesale price under both distribution systems is $w^F = w^R = \tilde{w}$.

(iii) For $\gamma q_L - c_L \leq \delta < (q_L/\gamma - c_L)(q_H - q_L)/q_H$, the manufacturer charges $w^F = \tilde{w}$ if internet sales are allowed and $w^R = \hat{w}_Q - \delta$ if internet sales are prohibited. Hence, the manufacturer strictly prefers to ban internet sales if

$$\hat{w}_Q - \delta > \tilde{w} \tag{A.54}$$

$$\iff \frac{1}{\gamma}(q_H - q_L) + c_L - \delta > \frac{q_H}{q_L} c_L + \frac{q_H - q_L}{q_L}\delta \tag{A.55}$$

$$\iff (q_H - q_L)\left[\frac{q_L}{\gamma} - c_L\right] > q_H \delta. \tag{A.56}$$

Note that $\delta < (q_L/\gamma - c_L)(q_H - q_L)/q_H$ and thus the above condition is always satisfied. Put verbally, the manufacturer strictly prefers to ban online sales.

(iv) For $\delta < \gamma q_L - c_L$, the maximal wholesale price if internet sales are allowed is $w^F = \hat{w}_P$. If internet sales are prohibited, the manufacturer charges $w^R = \hat{w}_Q - \delta$. The manufacturer strictly prefers to prohibit internet sales if

$$\hat{w}_Q - \delta > \hat{w}_P \tag{A.57}$$

$$\iff \frac{1-\gamma^2}{\gamma}(q_H - q_L) > \delta. \tag{A.58}$$

We know that $\delta < \gamma q_L - c_L$ and thus the above inequality holds if

$$\frac{1-\gamma^2}{\gamma}(q_H - q_L) \geq \gamma q_L - c_L \tag{A.59}$$

$$\iff (1-\gamma^2) q_H \geq q_L - \gamma c_L, \tag{A.60}$$

which holds always true (because (19) is violated). □

Proof of Corollary 1. The result follows immediately from Proposition 4. □

Proof of Proposition 5. The unbiased – experienced utility – of a consumer of type H is $u_H^E(q,p) = q - p + \mathbb{I}\delta$ and of type L is $u_L^E(q,p) = \min\{q, q_L\} - p + \mathbb{I}\delta$. Consumer welfare is defined as the sum of experienced utility of a type L and a type H consumer. A type L consumer either purchases quality q_L at a brick-and-mortar store at price $p_L^S = c_L + \delta$ or on the internet at $p_L^I = c_L$. Thus, his utility in equilibrium is always $u_L^E = q_L - c_L$.

A consumer of type H always purchases quality q_H at a brick-and-mortar store, i.e. at price p_H^S. First, suppose that (19) holds and that $\delta < \bar{\delta}_a$. If internet sales are allowed, we have $p_H^S = \hat{w}_P + \delta$. If internet sales are prohibited, we have $p_H^S = \hat{w}_Q + \delta$. As $\hat{w}_Q > \hat{w}_P$, the branded product is cheaper and consumer welfare is higher if it is illegal to ban internet sales.

Secondly, suppose that (19) is violated and that $\delta < \bar{\delta}_b$. We distinguish two subcases. (i) $\gamma q_L - c_L \leq \delta < (q_L/\gamma - c_L)(q_H - q_L)/q_H$: The prices at a brick-and-mortar store under the free and the restricted distribution system are $p_H^S = \tilde{w} + \delta$ and $p_H^S = \hat{w}_Q + \delta$, respectively. As $\hat{w}_Q > \tilde{w}$ in the relevant parameter range, the branded product is cheaper and consumer welfare is higher if it is illegal to ban internet sales. (ii) $\delta < \gamma q_L - c_L$: If internet sales are allowed, $p_H^S = \hat{w}_P + \delta$, while, if internet sales are prohibited, $p_H^S = \hat{w}_Q + \delta$. As $\hat{w}_Q > \hat{w}_P$, the branded product is cheaper and consumer welfare is higher if it is illegal to ban internet sales.

□

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