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One-Stop Shopping Behavior, Buyer Power, and Upstream Merger Incentives*

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Abstract

We analyze how consumer preferences for one-stop shopping affect the bargaining relationship between a retailer and its suppliers. One-stop shopping preferences create "demand complementarities" among otherwise independent products which lead to two opposing effects on upstream merger incentives: first a standard double mark-up problem and second a bargaining effect. The former creates merger incentives while the later induce suppliers to bargain separately. When buyer power becomes large enough, then suppliers stay separated which raises final good prices. Such an outcome is more likely when one-stop shopping is pronounced.

JEL-Classification: L22, L42, Q13

Keywords: One-stop shopping, buyer power, supplier merger

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1 Introduction

Consumers increasingly prefer to concentrate a substantial part of their weekly grocery purchases with a single retailer. Correspondingly, a recent survey conducted for the UK Competition Commission finds that "*[t]he main factor and most likely influential determinant of store choice is the ability to one-stop shop. Seven [respondents] in ten regarded it as an important factor and it was considered the primary reason of store choice by more than twice the proportion of any other factor*" (Competition Commission, 2000, Appendix 4.2, p. 30).[1] The same study reports that the respondents spend 85.3 percent of their overall expenditures on groceries at major supermarket chains. Parallel to the rise of consumer one-stop shopping behavior, the retail industry has gone through a strong consolidation process.[2] Meanwhile, large retailers are the essential intermediaries between manufacturers and consumers: unless manufacturers have not passed "the decision-making screen of a single dominant retailer" (FTC 2001), their products are not sold to final consumers.[3] Both developments, the increasing importance of consumer one-stop shopping behavior as well as the ongoing concentration process in the retail industry, have made suppliers being more and more dependent on fewer and larger retailers.

We analyze how one-stop shopping affects retail-supplier negotiations and we are interested in the question whether or not suppliers find it profitable to merge their businesses to counter buyer power.[4] More precisely, we consider two manufacturers selling their goods to a common retailer for further distribution to final consumers. Delivery is based on bilateral negotiations about a linear wholesale price. The supplied goods are assumed to be inherently independent.[5]

[1] Consistent with the high importance of one-stop shopping, the Competition Commission (2000) reports that only 18 percent of the respondents selected "price charged for groceries" as their main driver of store choice.

[2] Retail concentration has been sharply rising in Europe. The weighted average of the concentration ratio of the top-five retailers (CR 5) in the EU member states increased from about 40.7% in 1993 to 69% in 2002 (Dobson, Waterson, and Davis, 2003).

[3] The "gatekeeper" role of large retailers has become an issue in competition policy. For instance, the European Commission blocked the merger between the leading retail chains in Finland on the ground that it would further increase the existing gatekeeper power both retailers already had (see Kesko/Tuko COMP IV/M.784).

[4] The German Farmers Association, for example, recommended to consolidate activities of dairy processors as a way to counter retailer buyer power (*Milch und Rind*, 23 January, 2009).

[5] That is, demands for the products are independent in the absence of shopping costs; or, equivalently, when bought at the spot. Our results carry over to the case of imperfect substitutes. To single out the effect of one-stop

The retailer faces two different consumer types: one-stop shoppers and single-item shoppers. While a single item shopper engages in frequent shopping and buys only one of the goods per shopping trip, the one-stop shopper bundles its purchases in a single shopping trip, and by that, economizes on shopping costs.[6] The buying decision of one-stop shoppers, therefore, depends on overall expenses rather than on individual product prices. This causes pricing externalities which are similar to the pricing of complementary goods.[7] Ceteris paribus, one-stop shopping behavior results in higher wholesale prices if suppliers operate separately. Correspondingly, consumer one-stop shopping behavior creates strong upstream merger incentives as a merged supplier internalizes the negative pricing externality which increases the supplier's profit and leads to lower consumer prices.

Adding buyer power to this picture, the assessment of one-stop shopping changes dramatically. While suppliers are always better off by merging their businesses if the retailer is in a sufficiently weak bargaining position, suppliers counter increasing retailer bargaining power by negotiating separately. The underlying reason is a bargaining effect. To get the intuition, suppose suppliers stay independent. If the retailer fails to achieve an agreement with a single supplier, the supplier's product is no longer offered by the retailer.[8] This, in turn, diminishes the one-stop shoppers' ability to economize on their shopping costs implying a reduced demand for the remaining product. Hence, the sum of supplier profits when bargaining separately with

shopping on upstream merger incentives we suppressed additional incentives resulting from competition between substitutable goods.

[6] According to Dubé (2005), single-item shoppers purchase only what they currently need, while one-stop shoppers are aware of future consumption needs in between their (weekly) shopping trips.

[7] Fixed costs per shopping trip change demand elasticities for single products as they create demand complementarities; i.e., a higher price of product A tends to reduce the demand for product B, even though both products are inherently unrelated. The influence of shopping costs on multiproduct retailers' pricing decisions was analyzed in Klemperer (1992) and Beggs (1994). In a similar vein, the analysis of loss leading is based on shopping costs in Lal and Matutes (1994), DeGraba (2006), and Chen and Rey (2010). A similar feature is obtained in the bundling literature (see, for instance, Matutes and Regibeau, 1988).

[8] In our model, disagreement is an off-equilibrium outcome which pins down the retailer-supplier Nash bargaining problem. Consumer response to the stock-out of a product are studied intensively in the marketing literature. According to Sloot et al. (2005) "out-of-stock is a regular phenomenon for grocery shoppers" and the resulting gross margin losses for retailers have been estimated by Anderson Consulting (1996) to lie between \$7 and \$12 billion per year in the United States.

the retailer is larger compared to the profit obtained when the suppliers are merged and, thus, bargain jointly with the retailer. As a supplier merger always leads to lower wholesale prices, excessive buyer power together with one-stop shopping preferences can induce an inefficiently fragmented supplier structure which is detrimental to consumers and overall social welfare. The overall assessment of buyer power, however, remains mixed. Ceteris paribus, modest buyer power tends to lower the suppliers' mark-up which is at least partially passed on to consumers. Only if buyer power becomes very large to trigger strategic separation strategies on the suppliers' side, then it unfolds unambiguously negative effects on consumer and social welfare.[9]

We contribute to the literature on horizontal mergers in vertical structures. Most of that literature has been focusing on downstream mergers and the issue of buyer power through retail concentration (von Ungern-Sternberg, 1996; Dobson and Waterson, 1997). One-stop shopping has not been analyzed in that context so far. In a single model, we combine two opposing views on upstream merger incentives in the presence of demand complementarities. Since Cournot (1838), it is well known that firms selling complementary goods have strong incentives to merge to overcome the double mark up problem. In contrast, Horn and Wolinsky (1988b) show that the complementary of products gives rise to incentives to stay independent in order to extract more rents from a common retailer.[10] In our model we obtain the "Cournot" result whenever the retailer's bargaining is relatively low. If, however, the retailer's bargaining power increases, we obtain the latter result of Horn and Wolinsky (1988b) such that suppliers prefer to stay independent.

Buyer power of large retail chains is a major concern in practical competition policy[11] and has become a focus area in the industrial organization literature. A major presumption is that buyer power adversely affects suppliers to the detriment of consumer welfare. Our paper contributes to this issue by offering a new theory of harm which critically relies on one-stop shopping behavior.

[9] In our analysis we focus on negotiations about linear wholesale prices, but we also show how our argument remains valid when contracts allow for two-part tariffs.

[10] A similar result is obtained in Horn and Wolinsky (1988a) for the case of competing supply chains and linear input prices.

[11] See, for example, studies conducted by the UK Competition Commission (2000, 2003, 2008) and OECD (1998, 2008). Similar studies were conducted in the US and by the European Commission (see, FTC, 2001 and EC, 1999, respectively). In Germany, the Bundeskartellamt started a sector inquiry in 2009 which is still ongoing.

While the traditional monopsony analysis has assumed a perfectly competitive supply structure (neglecting the bargaining structure of intermediary goods markets), the more recent bargaining literature has either focused on the dynamic effects of rent-shifting or on the horizontal effects "differential" buyer power may exert on smaller retailers.[12] To the best of our knowledge, none of the discussed theories of harm based on buyer power refers to one-stop shopping and the possibility of excessive supplier fragmentation as a strategic outcome to counter retailer buyer power.

By considering the supplier-retailer relationship explicitly, we extend the existing literature on one-stop shopping. Stahl (1982) is an early account of consumer shopping behavior and the therewith-associated feature of positive demand externalities. Beggs (1994) shows that one-stop shopping can explain retailers' preferences for malls, though forming supermarkets is a best non-cooperative response. Klemperer (1992) shows how shopping costs affect duopoly competition between multi-product firms. He points out that firms have incentives to compete "head-to-head" (i.e., choosing the same product lines instead of differentiated assortments) to better exploit one-stop shoppers' lower demand elasticity.

The remainder of the paper is organized as follows. In Section 2 the model is specified. The game is solved in Section 3. Merger incentives for linear contracts are examined in Section 4. In Section 5, we discuss our assumptions and provide extensions of our basic model. Finally, Section 6 concludes.

2 The Model

Consider two upstream manufacturers M_i, $i = 1, 2$ that produce each a good $i = 1, 2$ at constant marginal cost c. We assume that goods 1 and 2 belong to different product categories and are, thus, independent. Both manufacturers sell their respective product to a common downstream retailer R that transforms one unit of input into one unit of a final consumer good. Retailer's

[12] Both latter theories remain hotly debated. Even though buyer power should reduce suppliers' overall profits, their incentives to undertake investments may very well increase when the retailing industry becomes more concentrated (see Inderst and Wey, 2003). The issue of differential buyer power relates to the issue of discrimination in intermediary goods markets and the possibility of a so-called "waterbed effect" (Inderst and Valetti, 2011; for a survey, see Dobson and Inderst, 2008).

transformation and distribution costs are normalized to zero. Thus, the retailer bears no other costs than those for getting delivered by the upstream manufacturers. Delivery contracts are determined through bilateral negotiations. We assume that the retailer negotiates simultaneously with both manufacturers about a delivery contract that specifies a uniform wholesale price w_i the retailer has to pay for each unit of input.[13] We relax this assumption in Section 5 where we allow for non-linear tariffs in the retailer-supplier relationships. Firms play a three-stage game. In the first stage, the manufacturers decide whether to merge their businesses or not. If the upstream firms merge, they continue to produce both products. In the second stage, the retailer negotiates either with both suppliers separately or with the merged entity about a linear delivery tariff. Finally, the retailer sets the prices in final consumer markets and consumers make their shopping decision.

Demand. Consumers are uniformly distributed with density of one along a line of infinite length. Their location is denoted by $\theta \in (-\infty, \infty)$, while we assume that the retailer is located at $\theta^R = 0$. Since the retailer is a local monopolist for the goods 1 and 2, consumers must travel to the retailer's outlet to make their purchases of goods 1 and 2. Thereby consumers incur transportation costs θt, where t is the transport cost rate and θ indicates the distance between the consumer located at θ and the retailer located at $\theta^R = 0$. Each consumer buys exactly one unit of each product. Thereby, we assume that a share $\lambda \in [0, 1]$ of consumers are one-stop shoppers buying both products at the same time, while a share of $1 - \lambda$ are single-item shoppers buying product 1 and product 2 in different trips.[14]

[13] The use of linear wholesale prices reflects the fact that contracts in vertical relations are not necessarily efficient. In particular, product nonspecifiability, demand uncertainty and unobservability of retail behavior may cause contracting problems in supplier-retailer relations (Iyer and Villas-Boas, 2003; Raskovich 2007). Referring to a recent study of the UK Competition Commission (2008) on pricing in intermediate good markets, Inderst and Valetti (2011) conclude that powerful retailers often obtain price discounts at the margin which can be easily captured by the assumption of linear tariffs in intermediate good markets. They also point to the observation that particularly fresh produce, bakery products and milk are often delivered to retailers based on a perfectly linear contract.

[14] Apparently, consumers reduce their shopping time by combining the purchase of products consumed today or in the future. The importance of one-stop shopping behavior is, therefore, increasing the more time constrained consumers are. Furthermore, one-stop shopping behavior may also occur in multi-person households, where the varying needs of the household members are satisfied in one single shopping trip. That is, one member is

Let v stand for consumer willingness to pay for a unit of good i. The utility of a single-item shopper located at θ_i^s is then given by[15]

$$U_i^s(\cdot) = \begin{cases} v - p_i - \theta_i^s t & \text{if good } i = 1,2 \text{ is bought} \\ 0 & \text{otherwise,} \end{cases} \tag{1}$$

where p_i indicates the price of good i set by the retailer. Solving (1) for θ_i^s, the location for the indifferent single-item shopper is

$$\theta_i^s(p_i, t) = \frac{v - p_i}{t} \text{ if } p_i \leq v. \tag{2}$$

The demand of the single-item shopper, thus, refers to

$$q_i^s(p_i, \cdot) = 2\theta_i^s(\cdot) \text{ if } v > p_i \geq v - t. \tag{3}$$

Likewise, the utility of the one-stop shopper located at θ^o is given by

$$U^m(\cdot) = \begin{cases} 2v - \sum_{i=1}^{2} p_i - \theta^o t & \text{if goods 1 and 2 are bought} \\ v - p_i - \theta^o t & \text{if only one good } i = 1,2 \text{ is bought} \\ 0 & \text{otherwise.} \end{cases} \tag{4}$$

That is, one-stop shoppers halve their transportation costs per product by bundling the purchases of good 1 and 2. Using (4), the location of the indifferent one-stop shopper is given by

$$\theta^o(p_1, p_2, t) = \frac{1}{t}\left(2v - \sum_{i=1}^{2} p_i\right) \text{ if } p_i \leq v \ \forall i = 1,2. \tag{5}$$

We then obtain the following demand functions of the one-stop shoppers:

$$q_i^o(p_1, p_2, \cdot) = 2\theta^o(\cdot) \text{ if } 2v > p_1 + p_2 \geq 2v - t \text{ and } p_i < v, \tag{6}$$

given that $p_j \leq v$. Taking (3) and (5) together, the overall demand the retailer faces for product i can be written as

$$Q_i(p_1, p_2, \cdot) = \lambda q_i^o(p_1, p_2, \cdot) + (1 - \lambda) q_i^s(p_i, \cdot).$$

responsible for shopping and, thus, bundles all required purchases instead of all individual family members making purchases on their own.

[15] We denote the variables associated with single-item shoppers by s. Variables associated with one-stop shoppers are indexed by o. Note further that we omit the arguments of the function when it does not cause any confusion.

Although the products are inherently independent, the overall demand for product i also depends on the price for product $j \neq i$, whenever the share of one-stop shoppers in the population is positive. Precisely, the overall demand for product i is increasing in the price for product j, i.e., $\partial Q_i / \partial p_j < 0$. That is, a higher price for one product reduces not only the demand for this respective product but also the demand for the other product offered by the retailer.[16] In that sense, product become complements through one-stop shopping behavior. The intuition is as follows: a higher price for good j results in a higher price for the one-stop shopper's shopping basket. As a consequence, less one-stop shoppers buy at the retailer. The single-item shopper's demand for good i remains unaffected by a changing price for good j.

If the retailer offers only product i, one-stop shoppers do not abstain from shopping at all but purchase the remaining good $j \neq i$. Then, one-stop shoppers incur the same shopping costs per good as single-item shoppers. Thus, the indifferent one-stop shopper in the one product case is equal to the indifferent single-item shopper. Accordingly, we get $\widehat{q}_1^o\left(p_1, \infty, \cdot\right) = q_1^s\left(p_1, \cdot\right)$ and $\widehat{q}_2^o\left(\infty, p_2, \cdot\right) = q_2^s\left(p_2, \cdot\right)$, resulting in

$$Q_1(p_1, \infty, \cdot) = \lambda q_1^o\left(p_1, \infty, \cdot\right) + (1-\lambda) q_1^s\left(p_1, \cdot\right)$$

and

$$Q_2(\infty, p_2, \cdot) = \lambda q_2^o\left(\infty, p_2, \cdot\right) + (1-\lambda) q_2^s\left(p_2, \cdot\right),$$

respectively.

Profits. Considering separate suppliers in the upstream market and taking into account the demand of all consumer types and their share in total population, retailer's profit can be written as

$$\pi\left(p_1, p_2, \cdot\right) = \sum_{i=1}^{2} \left(p_i - w_i\right) Q_i\left(p_1, p_2, \cdot\right), \tag{7}$$

if both products are sold (i.e., $p_1, p_2 \leq 1$). Note that an increase of one-stop shoppers implies a shift of the total demand since one-stop shopping lowers consumer transportation costs. If the retailer fails to achieve an agreement with supplier 1 and, therefore, sells only product 2, the retailer profit is given by

$$\pi_{-1}(\infty, p_2, \cdot) = \left(p_2 - w_2\right) Q_2(\infty, p_2, \cdot). \tag{8}$$

[16] For an early account of these effects see Stahl (1982, 1987) and Beggs (1994).

Correspondingly, if negotiations fail with supplier 2, the retailer profit are

$$\pi_{-2}(p_1, \infty, \cdot) = (p_1 - w_1)\, Q_1(p_1, \infty, \cdot).$$

In the case of an upstream merger, the retailer bargains with the merged supplier about the delivery of both products instead of bargaining with both suppliers separately. Accordingly, the retailer's disagreement payoff is then equal to zero.

Turning to suppliers, the profit of each independent supplier i is given by

$$\varphi_i\,(p_1, p_2, \cdot) = (w_i - c)\left[\lambda q_i^o\,(p_i, \cdot) + (1-\lambda)\, q_i^s\,(p_i, \cdot)\right], \tag{9}$$

while the profit of a merged supplier refers to

$$\varphi^m\,(p_1, p_2, \cdot) = \sum_{i=1}^{2} (w_i - c)\left[\lambda q_i^o\,(p_i, \cdot) + (1-\lambda)\, q_i^s\,(p_i, \cdot)\right]. \tag{10}$$

3 Analysis

Using subgame-perfect Nash equilibrium as our equilibrium concept, we proceed by solving first for the equilibrium retail prices in stage three. We then move backward to solve the bargaining stage. Two cases must be considered. If the manufacturers decide to merge in the first stage of the game, an upstream monopoly occurs that sells two products to the downstream retailer. Otherwise there remains an upstream duopoly, where the retailer negotiates with both suppliers separately.

Downstream Prices. In the last stage of the game, the retailer sets the prices for both products in the final consumer market. Using (7) together with (3) and (6), focusing on interior solutions for $\theta^o\,(\cdot)$ and $\theta_i^s\,(\cdot)$, and assuming $w_1, w_2 \leq v$, we obtain the equilibrium retail price $p_i^*(w_i) = (v + w_i)/2$. That is, the retailer sets its monopoly price which does not depend on the shares of the different consumer types.

Using (7) and (8), we obtain the reduced profit functions of the retailer in the second stage of the game; namely, $\pi^*\,(p_i^*(w_i), p_j(w_j), \cdot)$ and $\pi_{-i}^*(\infty, p_j^*(w_j), \cdot)$. The reduced profit functions of the supplier refer to $\varphi_i^*\,(p_i^*(w_i), \cdot)$ and $\varphi^{m*}\,(p_i^*(w_i), \cdot)$.

Bargaining in Input Markets. Taking the upstream market structure as given, the retailer negotiates bilaterally with either the separate suppliers or the merged entity about a linear wholesale price w_i for each product $i = 1, 2$. Negotiations take place simultaneously in the case of an upstream duopoly. The aim of each retailer-supplier pair is to maximize their respective joint profit when determining the wholesale price.[17] The gains from trade are divided such that each party gets its disagreement payoff plus a share of the incremental gains from trade. We use the asymmetric Nash bargaining solution with $\delta \in [0, 1]$ measuring the bargaining power of the retailer. The value $1 - \delta$ then represents the bargaining going of the supplier(s). Note that we assume that a merger does not affect the exogenously given bargaining power of the suppliers. Thus, in the case of $\delta = 1$ the retailer makes a take-it or leave-it offers to the suppliers, while the suppliers have the full bargaining power in the case of $\delta = 0$. If the retailer does not reach an agreement with supplier i, the retailer can still sell product j to final consumers earning $\pi^*_{-i}(\cdot)$.[18] In turn, the manufacturers have no selling alternative, as the retailer is considered as a local gatekeeper to final consumer markets. Hence, the suppliers' disagreement payoff is assumed to be zero.

Applying the asymmetric Nash bargaining solution, the equilibrium wholesale prices w_i^* follows from the condition

$$(1-\delta)\left[\pi^*(\cdot) - \pi^*_{-i}(\cdot)\right] \frac{\partial \varphi_i^*(\cdot)}{\partial w_i} + \delta \varphi_i^*(\cdot) \frac{\partial \pi^*(\cdot)}{\partial w_i} = 0, \text{ for } i = 1, 2. \tag{11}$$

Solving (11) and using symmetry, we obtain the equilibrium wholesale prices

$$w^*(\cdot) = w_1^*(\cdot) = w_2^*(\cdot) = \frac{v(1-\delta)(1+\lambda)(1+2\lambda) + c\left[(1+\delta)(1+2\lambda) + 2\delta\lambda^2\right]}{2 + (5 - \delta + 2\lambda)\lambda}.$$

In the case of an upstream merger, we assume that the retailer and the merged supplier negotiate about the delivery of both products together. That is, neither the retailer nor the supplier have any trading alternative if no agreement is reached. Accordingly, the equilibrium wholesale price w_i^m is implicitly given by the solution of

$$(1-\delta)\,\pi^*(\cdot) \frac{\partial \varphi^{m*}(\cdot)}{\partial w_i} + \delta \varphi^{m*}(\cdot) \frac{\partial \pi^*(\cdot)}{\partial w_i} = 0. \tag{12}$$

Solving (12), we get

$$w^{m*}(\cdot) = w_1^{m*}(\cdot) = w_2^{m*}(\cdot) = \frac{v(1-\delta) + c(1+\delta)}{2}.$$

[17] For a non-cooperative foundation of the generalized Nash bargaining solution, see Binmore et al. (1986).

[18] Thus, we assume that the one-stop shoppers go to the retailer even if they cannot purchase their entire shopping basket.

Note that we get exactly the same result for $w^{m*}(\cdot)$ if the retailer and the merged supplier negotiate the wholesale prices for both goods separately but simultaneously. Comparing $w^{*}(\cdot)$ to $w^{m*}(\cdot)$, we get the following result.[19]

Lemma 1. *The wholesale price w^* negotiated with an independent supplier always exceeds the wholesale price w^{m*} negotiated with a merged supplier, i.e. $w^* \geq w^{m*}$ (with equality holding for $\lambda = 0$). Furthermore, both wholesale prices are decreasing in δ, while w^* is increasing in λ and w^{m*} is independent of λ.*

Obviously, the negotiated wholesale prices $w^{*}(\cdot)$ and $w^{m*}(\cdot)$ are equal if all consumers act as single-item shoppers, i.e. $\lambda = 0$. However, if at least some consumers act as one-stop shoppers, i.e. $\lambda > 0$, the wholesale price negotiated with an independent supplier exceeds the wholesale price negotiated with a merged supplier, i.e. $w^{*}(\cdot) > w^{m}(\cdot)$. This is due to the fact that consumer one-stop shopping behavior induces positive demand externalities between the products offered by the retailer. By combining their purchases, one-stop shoppers have lower shopping costs per item purchased than single shoppers. The demand of one-stop shoppers, i.e. $q_i^o(p_1^*, p_2^*, \cdot)$, therefore, exceeds the demand of single shoppers, i.e. $q_i^s(p_i^*, \cdot)$. The cost advantage of the one-stop shoppers disappears if the retailer fails to achieve an agreement with one of the suppliers and, thus, sells only one product to final consumers. Then, the demand of both types of consumers is the same, i.e. $q_i^o(p_i^*, \infty, \cdot) = q_i^s(p_i^*, \cdot)$. Accordingly, the marginal contribution of each supplier is increasing in the share of one-stop shoppers in population. Contrary to separate suppliers a merged supplier internalizes the complementarity effect from one-stop shopping. Hence, the wholesale prices negotiated with separate suppliers are higher than those negotiated with a merged supplier, i.e. $w^{*}(\cdot) \geq w^{m*}(\cdot)$. This implies $p_i(w^*) \geq p_i(w^{m*})$.

4 Merger Incentives

The upstream merger incentives are given by

$$\Psi(\cdot) := \varphi^{m**}(w^{m*}, \cdot) - \sum_{i=1}^{2} \varphi_i^{**}(w^*, \cdot), \tag{13}$$

[19] All proofs can be found in the Appendix.

where $\varphi^{m**}(w^{m*}, \cdot)$ and $\varphi_i^{**}(w^*, \cdot)$ denote the reduced profit functions of the suppliers in the first stage of the game. We assume that suppliers merge, whenever their merger incentives are non-negative. If all consumers are single shoppers, i.e. $\lambda = 0$, the wholesale prices do not depend on whether suppliers separate or merged. Accordingly, suppliers are indifferent whether to merge their businesses or not. In turn, if at least some consumers have one-stop shopping preferences separate suppliers obtain a higher wholesale price than merged suppliers. More precisely, the wholesale price negotiated with separate suppliers, i.e. w^*, is increasing in the share of one-stop shoppers, i.e. λ, while the wholesale price negotiated with a merged supplier, i.e. w^{m*}, does not depend on the share of one-stop shoppers in population. This implies the following trade-off separate suppliers have to deal with: increasing wholesale prices induce an increase of the suppliers' share of the total pie, while the total pie itself is decreasing at the same time. Suppliers, therefore, benefit from negotiating separately with the retailer as long as there are only few one-stop shoppers in population.[20] In turn, if the share of one-stop shoppers in population is sufficiently high, suppliers prefer to merge in order to counter the rising double mark-up problem. This is due to the fact that a merged supplier internalizes the positive demand externalities resulting from consumer one-stop shopping behavior.[21]

Proposition 1. *For δ sufficiently low, there exists a unique threshold value $\lambda^k(\delta)$ such that $\varphi^{m**}\left(\lambda^k, \cdot\right) = \sum_{i=1}^{2} \varphi_i^{**}\left(\lambda^k, \cdot\right)$. An upstream merger is profitable (not profitable) for all $\lambda \geq \lambda^k(\delta)$ $(\lambda < \lambda^k(\delta))$. Moreover, $\lambda^k(0) = 0$ and λ^k is monotonically increasing in δ.*

Our analysis is likewise instructive for the assessment of the increasing buyer power of large retail chains. An increasing bargaining power of the retailer, i.e. δ, tends to push wholesale prices down, softening the double mark-up problem in the case of independent suppliers. In other words, if suppliers face a buyer endowed with a higher level of bargaining power, the joint surplus of independent suppliers tends to become larger compared with the surplus that a single supplier can extract from the retailer. Buyer power, therefore, counters the upstream merger incentives caused by consumer one-stop shopping behavior. However, buyer power is socially

[20] This is similar to the effect described in Horn and Wolinsky (1988 a, b).

[21] As is well-known, overcoming the double mark-up problem gives rise to strong merger incentives. This effect is analyzed by Gaudet and Salant (1992) and Deneckere and Davidson (1985) for the case of complementary products.

desirable as long as the upstream market structure does not change. But if the increase in buyer power triggers a separation of suppliers, welfare is harmed because of the inevitable increase in wholesale prices.

Proposition 2. *An increase in the retailer's buyer power from δ' to δ'' (with $\delta' < \delta''$) increases social welfare if the upstream structure remains the same. An increase in the retailer's buyer power reduces social welfare if it triggers a separation of suppliers; i.e., if $\lambda \geq \lambda^k(\delta')$ holds before and $\lambda < \lambda^k(\delta'')$ holds after the increase in buyer power. Such an outcome is more likely that larger the share of one-stop shoppers.*

Proposition 2 uncovers a new channel through which buyer power can harm consumers and overall social welfare. If buyer power is strong, then both the wholesale price and the profit of a merged supplier are low. If one-stop shopping is now sufficiently pronounced, then disintegrating the upstream suppliers becomes optimal (i.e., to bargain separately). The reason is that in those instances, the retailer's loss in case of disagreement with a single supplier is relatively large which increases the independent suppliers' profits when compared with bargaining jointly. Hence, for a given level of one-stop shopping, an increase in buyer power (i.e., in δ) tends to induce more fragmented supplier structures which lead to higher price for final goods. A similar effect follows when we fix the level of buyer power, while the share of one-stop shopping consumers increases.

5 Extensions and Discussion

In this section, we extend our basic model. In order to assess the impact of different negotiation structures on the bargaining outcomes and finally on the upstream merger incentives, we first relax the assumption of simultaneous bargaining and then allow for non-linear tariffs.

Sequential Bargaining. In this section we relax the assumption of simultaneous bargaining and assume that the retailer negotiates sequentially with both suppliers. Let supplier i be the first to negotiate with the retailer. Given that the bargaining outcome with supplier i is public information, the retailer negotiates subsequently with supplier j. Due to the sequential bargaining structure, it turns out that $\widetilde{w}_j^*$ is a function of $\widetilde{w}_i$, i.e. $\widetilde{w}_j^*(\widetilde{w}_i, \lambda, \cdot)$. In the case of disagreement with the first supplier, the retailer still enters into negotiations with the second supplier. If, in turn, the retailer does not achieve an agreement with the second supplier, the retailer continues to sell the first product. Note that we do not allow for renegotiation.

Using backward induction, we first solve for the bargaining outcome between the retailer and supplier j. The disagreement payoff of the retailer is determined by the negotiation outcome with supplier i (see 8). Thus, the equilibrium wholesale price $\widetilde{w}_j^*(w_i, \lambda, \cdot)$ is characterized by the solution of

$$(1-\delta)\,\Delta\pi_j \frac{\partial\varphi_j^*(w_i, w_j, \cdot)}{\partial w_j} + \delta\varphi_j^*(w_i, w_j, \cdot)\,\frac{\partial\Delta\pi_j}{\partial w_j} = 0 \tag{14}$$

$$\text{with: } \Delta\pi_j = \pi^*(w_i, w_j \cdot) - \widehat{\pi}_i(w_i, \cdot)\,.$$

Given this result, we turn to the first negotiation where the retailer seeks for an agreement with supplier i. The equilibrium wholesale price $\widetilde{w}_i^*(\lambda, \cdot)$ is given by the solution of

$$(1-\delta)\,\Delta\pi_i \frac{d\varphi_i^*(w_i, w_j(w_i), \cdot)}{dw_i} + \delta\varphi_i^*(w_i, w_j(w_i), \cdot)\,\frac{d\Delta\pi_i}{dw_i} = 0 \tag{15}$$

$$\text{with: } \Delta\pi_i(w_i, w_j(w_i), \cdot) = \pi^*(w_i, w_j(w_i), \cdot) - \widehat{\pi}_j^*(w_j(w_i), \cdot)\,.$$

Comparing (14) and (15) and analyzing the comparative statics for $\widetilde{w}_j^*$ in $\widetilde{w}_i^*$, we get:

Proposition 3. *The wholesale price negotiated with the second supplier is decreasing in the wholesale price negotiated with the first supplier, i.e.* $d\widetilde{w}_j^*(w_i, \cdot)/dw_i < 0$, *resulting in* $\widetilde{w}_i^* > \widetilde{w}_j^*$. *Comparing the results of the sequential negotiations with them of simultaneous negotiations, we have* $\widetilde{w}_i^* > w^* > \widetilde{w}_j^*$.

The retailer and the first supplier agree on a higher wholesale price in order to reduce the demand for the second good. This, in turn, diminishes the incremental contribution of the second supplier to the joint profit with the retailer. In other words, the higher the wholesale price negotiated with the first supplier the weaker the bargaining position of the second supplier, i.e. $d\widetilde{w}_j^*(w_i, \cdot)/dw_i < 0$. The first supplier, therefore, gets a higher share from the joint profit than the second supplier, i.e. $\widetilde{w}_i^* > \widetilde{w}_j^*$. Note that the wholesale price negotiated with the first supplier in a sequential bargaining framework exceeds the wholesale price determined in simultaneous negotiations, i.e. $\widetilde{w}_i^* > w^*$. In turn, the wholesale price negotiated with the second supplier undercuts the simultaneously negotiated wholesale price, i.e. $\widetilde{w}_j^* < w^*$. It turns out that the first supplier M_i benefits more from the externality induced by consumer one-stop shopping behavior than the second supplier M_j. However, the suppliers benefit equally from consumer one-stop shopping behavior if they negotiate simultaneously with the retailer.

If the suppliers merge, we assume that the merged supplier and the retailer negotiate about the delivery contracts for both products together. Accordingly, the wholesale price is the same as analyzed in (12). Obviously, for $\lambda > 0$ the wholesale price negotiated sequentially with both suppliers exceed the wholesale price negotiated with the merged supplier. Based on these outcomes we analyze the upstream merger incentives in the sequential bargaining framework. A critical value $\widetilde{\lambda}^{k}(\delta)$ is implicitly defined by

$$\varphi^{m*}\left(w^{m*}, \widetilde{\lambda}^{k}, \cdot\right) \equiv \sum_{i=1}^{2} \varphi_i^{*}\left(\widetilde{w}_i^{*}, \widetilde{w}_j^{*}, \widetilde{\lambda}^{k}, \cdot\right),$$

where suppliers are indifferent of whether to merge or not. For all $\lambda > \widetilde{\lambda}^{k}(\delta)$ the suppliers tend to merge their businesses. Compared to the case with simultaneous negotiations, mergers are less likely. This is due to the fact that the lower wholesale price for product j compensates the higher wholesale price for product i.

Non-linear Contracts. Consider now that the retailer negotiates simultaneously with both suppliers about a non-linear contract, entailing a wholesale price and a fixed fee. The wholesale price is set equal to suppliers' marginal costs. This makes the retailer the residual claimant of the vertically integrated profit. Accordingly, the retailer sets prices in the final consumer market as to maximize the overall profit of the vertical structure. The joint profit of each supplier-retailer pair is then divided by the fixed fee. That is, the retailer transfers rents to the upstream suppliers via a fixed fee. In this framework, one-stop shopping behavior does not trigger any merger incentives at the upstream level.

However, merger incentives occur if the retailer negotiates sequentially with the suppliers on a non-linear supply contract.[22] As the negotiation outcome between the retailer and the second supplier does not affect the contract chosen with the first supplier, there is no incentive to distort the wholesale price. Thus, the equilibrium wholesale price negotiated with the second supplier equals marginal cost. Turning to the first negotiation, the retailer and the supplier have an incentive to extract rent from the second supplier by distorting the wholesale price. The higher the wholesale price for the product of the first supplier, the lower the demand for

[22] The following reasoning is based on Marx and Shaffer (1999 and 2007), analyzing rent- shifting in a sequential bargaining framework with two suppliers and a common retailer. While Marx and Shaffer (1999 and 2007) focus on substitutable goods, we consider complements. For a more detailed analysis see Caprice and von Schlippenbach (2010).

the second product. This reduces the incremental contribution of the second supplier enabling the retailer and the first supplier to extract rents from the second supplier. Compared to the sequential bargaining framework with linear wholesale prices, the retailer is willing to pay a higher wholesale price to the first supplier as it can get compensated by a negative fixed fee. More precisely, the first supplier pays a fixed fee to the retailer. Due to the higher wholesale price for the first product, the double marginalization becomes more severe for increasing one-stop shopping among consumers such that upstream mergers become more likely even for lower values of λ.

6 Conclusion

So far, the literature on consumer one-stop shopping behavior does not consider the vertical structure preceding consumer markets. The literature on buyer power, in turn, focuses mainly on merger incentives at the retail level. In this paper we bridge both strands of literature. We examine the bargaining relationship between a retailer and two suppliers, assuming the specific environment of today's retail markets. *First*, the retailer enjoys monopoly power vis-à-vis consumers. *Second*, delivery contracts and wholesale prices are determined in bilateral negotiations where the retailer may have substantial bargaining power. *Third*, consumers benefit from a larger assortment because of their preferences for one-stop shopping.

We show that shopping behavior may have important implications for both the supplier-retailer relationship as well as the strategic behavior at the upstream and downstream level. If consumers prefer to bundle their purchases in order to economize on their shopping time, two kinds of complementarities arise. First, inherently independent goods become complementary which creates pricing externalities. Second, formerly independent bilateral bargaining relations also become complementary which weakens the retailer's disagreement payoff, and hence, improves the bargaining position of an independent supplier.

The first effect creates incentives to merge which are known since Cournot (1838). The second effect works in the opposite direction such that staying separate becomes more attractive; a phenomenon known from models of wage bargaining between a firm and complementary unions (Horn and Wolinsky, 1988a, b). We find that the second effect unambiguously increases when buyer power becomes more pronounced. If buyer power is sufficiently large, then suppliers always stay separated because of bargaining reasons.

We also show that upstream mergers imply lower wholesale prices such that they are always socially beneficial. Therefore, competition authorities are well advised to take a retailer's countervailing power into account when deciding about mergers between upstream suppliers. With regard to the assessment of the increasing buyer power of large retail chains, our analysis gives a mixed picture. For a given upstream market structure increasing buyer power tends to lower wholesale prices which is desirable both from a consumer and a social welfare perspective. However, if buyer power becomes sufficiently large, then suppliers may respond by separating their businesses to counter power. If this is the case, a new channel of competitive harm opens up which raises prices consumer face in retail outlets.

We regard our model as a first step into incorporating consumer shopping behavior into the vertical contracting problem suppliers and retailers face. As several studies of the marketing literature show, consumers respond very differently to out-of-stock problems (see, for example, Campoet al., 2000; Sloot et al., 2005). Those works are potentially important to better specify the disagreement points of both the retailer and the supplier. In the same vain, it would be desirable to consider competition between retailers.

Appendix

Proof of Lemma 1. For $\lambda = 0$, it is easy to check that wholesale prices do not depend on the supply structure. However, with $\lambda > 0$, we get that $w^* > w^{m*}$ since

$$w^*(\cdot) - w^{m*}(\cdot) = \frac{(1-\lambda)\lambda(1+\delta+2\lambda)(v-c)}{4+2\lambda(5-\delta+2\lambda)} > 0. \tag{16}$$

Turning to comparative statics, w^{m*} is obviously decreasing in δ and independent of λ. In turn, the comparative static of w^* in λ and δ is given by

$$\frac{\partial w^*}{\partial \lambda} = \frac{(1-\delta)(v-c)\left[1+2(2-\delta)\lambda^2+4\lambda+\delta\right]}{\left[2+\lambda(5-\delta+2\lambda)\right]^2} > 0 \text{ and} \tag{17}$$

$$\frac{\partial w^*}{\partial \delta} = -\frac{2(1+\lambda)^3(1+2\lambda)(v-c)}{\left[2+\lambda(5-\delta+2\lambda)\right]^2} < 0. \tag{18}$$

Proof of Proposition 1. Employing (13) and solving

$$\varphi^{m**}\left(\lambda^k,\cdot\right) \equiv \sum_{i=1}^{2} \varphi_i^{**}\left(\lambda^k,\cdot\right) \tag{19}$$

for $\lambda^k(\delta)$, we get

$$\lambda^k(\delta) = \frac{1-(10-\delta)\,\delta-\sqrt{1+\delta\left[12+\delta\left(6-20\delta+\delta^2\right)\right]}}{4(3\delta-1)}. \tag{20}$$

Setting $\delta = 0$, we get $\lambda^k(0) = 0$. Finally, taking the derivative of λ^k with respect to δ, we obtain

$$\frac{\partial \lambda^k}{\partial \delta} = \frac{9+24\delta-30\delta^2+32\delta^3-3\delta^4+\left[7-\delta\left(2-3\delta\right)\right]\psi}{4(1-3\delta)^2\psi} \tag{21}$$

with $\psi := \sqrt{1+\delta\left[12+\delta\left(6-20\delta+\delta^2\right)\right]}$. Since $\partial\lambda^k/\partial\delta$ is strictly positive for the considered parameter range, λ^k is monotonically increasing in δ.

Proof of Proposition 2. To prove the first part of Lemma **??,** we denote equation (14) as N_2 showing that $\partial^2 N_2/\partial w_j \partial w_i < 0\big|_{w_j=\widetilde{w}_j^*}$. Using concavity of the Nash bargaining solution, i.e. $\partial^2 N_2/\partial w_j^2 < 0$, we get

$$\frac{d\widetilde{w}_j^*}{dw_i} = -\frac{\partial^2 N_2/\partial w_j \partial w_i}{\partial^2 N_2/\partial^2 w_j} < 0.$$

In order to prove $\widetilde{w}_i^* > \widetilde{w}_j^*$, we show that (15) is positive if $w_i = \widetilde{w}_j^*$.[23]Rearranging terms, we obtain

$$\begin{aligned}
&(1-\delta)\left[\pi^*(\cdot)-\widehat{\pi}_j^*\left(w_j(1,\cdot),\cdot\right)\right]\frac{d\varphi_i^*(\cdot)}{dw_i}\bigg|_{w_i=\widetilde{w}_j^*}\\
>\quad & -\delta\varphi_i^*(\cdot)\,\frac{d\left[\pi^*(\cdot)-\widehat{\pi}_j^*\left(w_j(1,\cdot),\cdot\right)\right]}{dw_i}\Bigg|_{w_i=\widetilde{w}_j^*}.
\end{aligned}$$

Using (14) and

$$-\delta\varphi_i^*(\cdot)\,\frac{\partial\left[\pi^*(\cdot)-\widehat{\pi}_j^*\left(w_j(1,\cdot),\cdot\right)\right]}{\partial w_i}\Bigg|_{w_i=\widetilde{w}_j^*} = -\,\delta\varphi_j^*(\cdot)\,\frac{\partial\left[\pi^*(\cdot)-\widehat{\pi}_i^*\left(w_i,\cdot\right)\right]}{\partial w_j}\Bigg|_{w_i=\widetilde{w}_j^*},$$

we get

$$\begin{aligned}
&\left[\pi^*(\cdot)-\widehat{\pi}_j^*\left(w_j(1,\cdot),\cdot\right)\right]\quad\left[\frac{\partial\varphi_i^*(\cdot)}{\partial w_i}+\frac{\partial\varphi_i^*(\cdot)}{\partial\widetilde{w}_j^*}\frac{\partial\widetilde{w}_j^*}{\partial w_i}\right]\Bigg|_{w_i=\widetilde{w}_j^*}\\
>\quad&\left[\pi^*(\cdot)-\widehat{\pi}_i\left(w_i,\cdot\right)\right]\frac{\partial\varphi_j^*(\cdot)}{\partial\widetilde{w}_j^*}-\frac{\delta}{1-\delta}\varphi_i^*\frac{\partial\pi^*(\cdot)}{\partial\widetilde{w}_j^*}\frac{\partial\widetilde{w}_j^*}{\partial w_i}.
\end{aligned}$$

This inequality is fulfilled since

$$\widehat{\pi}_i\left(w_i,\cdot\right) > \widehat{\pi}_j^*\left(w_j(1,\cdot),\cdot\right),\quad \frac{\partial\varphi_i^*(\cdot)}{\partial w_i}\bigg|_{w_i=\widetilde{w}_j^*} = \frac{\partial\varphi_j^*(\cdot)}{\partial w_j}\text{ and }\frac{\partial\varphi_i^*(\cdot)}{\partial w_j},\frac{\partial\widetilde{w}_j^*}{\partial w_i},\frac{\partial\pi^*(\cdot)}{\partial w_j} < 0.$$

[23]From the simultaneous game we already know that there exists a w_i^* such that $w_i = w_j$.

Thus, we get that $\widehat{\pi}_j^*(\cdot) < \widehat{\pi}_i(w_i, \cdot)$ implying that $\widetilde{w}_i^* > \widetilde{w}_j^*$. Comparing $\widetilde{w}_i^*$ to w_i^*, we denote (15) as N_1 and show that

$$\left.\frac{\partial N_1}{\partial w_i}\right|_{w_i = w_i^*} = p_i \frac{\partial \lambda q_i(w_i, w_j(w_i))}{\partial w_j} \frac{\partial w_j}{\partial w_i} > 0.$$

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