The Economics of Retailing Formats:  
Competition versus Bargaining*

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Abstract

We set up a merger game between retailing stores to study the incentives of independent stores to form a big store when some consumers have preferences for one-stop shopping. We find that big stores will not be formed when the stores’ bargaining power vis-a-vis producers is high. Otherwise, an asymmetric situation occurs with only one big store created when one-stop shoppers are abundant.

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1 Introduction

According to Deloitte (2012), the world’s three largest retailing companies have the superstore as their dominant operational format.\(^1\) It seems as if small stores are driven out by big ones.\(^+\) In this paper, we relate this development to the recent rise in consumers’ preferences for one-stop shopping, i.e., to buy all goods needed on a single shopping trip.\(^2\) The presence of one-stop shoppers will, on the one hand, make big stores compete more fiercely, since they have a broader spectrum of products with which to attract the one-stop shoppers, and this tends to reduce incentives to create big stores. On the other hand, big stores stand stronger in bargaining of contract terms with producers, since a bargaining breakdown with one supplier still leaves them with other goods with which to attract consumers, and this tends to increase these incentives.

In the present analysis, we set up a simple model to discuss the creation of big stores as the outcome of an interplay of two forces: the extent of one-stop shopping in the economy, and retailers’ buyer power towards suppliers. We find, in our analysis of the model, that the incentive to form a big store is weak when stores’ bargaining power towards suppliers is large: In this case, there is little to gain in terms of contracts with suppliers from creating a big store, so that the negative effect of a big store on product prices dominates. When suppliers have most of the bargaining power, on the other hand, this is turned around. But with many one-stop shopping consumers, there will not be room for more than one big store in the market, as responding to the establishment of one big store with the creation of another one would lead to too much competition.

Our work follows up on Johansen (2012), from whom we borrow our modelling of one-stop shopping. He discusses the effect of buyer power in an economy with both big and small stores. He does not, however, discuss incentives for creating big stores, as we do here.\(^3\)

Our work is also related to that of Smith and Hay (2005), who discuss competition between shopping centres under three modes of organization of the centres: what they call streets, malls, and supermarkets. Their streets and supermarkets are similar to our independent and big stores, respectively, whereas their notion of a mall is one where the number of product categories on offer in a mall is internalized by a mall developer. They

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\(^1\)The three are Wal-Mart of the US, Carrefour of France, and Tesco of the UK.

\(^2\)The increased incidence of one-stop shopping is discussed, e.g., in OECD (1999) and UK Competition Commission (2000). Empirical evidence of one-stop shopping is found in the recent study by Heimeshoff and Klein (2012).

\(^3\)Competition among big and small stores is also discussed by Cleeren, et al. (2010) and Chen and Rey (2012).
keep the mode of shopping-centre organization exogenous and therefore do not discuss, as we do here, the incentives to form a big store.

Like us, Beggs (1994) discusses incentives to form big stores. However, he does not present a structural model of one-stop shopping, in fact simply discussing a merger game between two groups of firms offering complementary products. Thus, neither the role of the stores’ bargaining power nor that of the degree of one-stop shopping preferences play any direct role in his analysis. In particular, his result that merger incentives are weak in a shopping mall is here turned around if stores have sufficiently low bargaining power vis-a-vis suppliers.

Several papers in the recent literature on buyer power in retailing discuss how the creation of big buyers, through mergers or alliances, makes those bigger buyers better off in supplier/retailer negotiations. Some papers discuss the effect of buyer size in a situation where all retailers compete in the same market; see, e.g., Chipty and Snyder (1999). Other papers, such as Inderst and Shaffer (2007) and Bedre-Defolie and Caprice (2011), discuss the effects of buyer size caused by mergers of retailers in different markets to form retail chains. Our work, as well as Johansen (2012), are distinct from the earlier studies in our focus on the effects on the negotiations with suppliers of the creation of a big store created through the combination of complementary goods.

We make use of the generalized, or asymmetric, Nash bargaining solution; so do also Inderst and Shaffer (2007), whereas other papers mentioned above insist on a symmetric bargaining outcome. This way, we are able to spell out how the exogenous bargaining power affects retailers’ incentives to create an inside option, in this case by forming big stores.

Finally, our study contributes to a recent literature on how the emergence of one-stop shopping preferences among consumers affects the supplier/retailer negotiations. Earlier studies on this issue include von Schlippenbach and Wey (2011) and Caprice and von Schlippenbach (2012). We are distinct from these papers in our interest in analysing the interplay between consumers’ one-stop shopping and retailers’ buyer power in shaping incentives for the creation of big stores.

This paper is organized as follows. The model is presented in Section 2. In Section 3, we analyze the three situations when there is no, one, and two big stores formed. Summing up that analysis, we present the outcome of the merger game in Section 4. Finally, some concluding remarks are offered in Section 5, while a proof of one of our results is relegated

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4 See Inderst and Shaffer (2008) for a survey of a part of this literature.

to an Appendix.

2 The model

We consider a market with two manufacturers, \( i \neq h \in \{ A, B \} \), distributing their products via two retail locations, \( j \neq k \in \{ 0, 1 \} \), at opposite ends of a Hotelling line of unit length. In what follows, we will systematically use subscripts \( i \) and \( h \) to denote manufacturers (products), and subscripts \( j \) and \( k \) to denote retail locations.

At each location, there are, at the outset, two single-product retailers (small retailers) who stock different products (one selling \( A \), the other selling \( B \)). Importantly, we allow the small retailers at each location to merge and form a larger integrated retail unit (a big retailer) that sells both products, \( A \) and \( B \). There are thus three types of downstream market structures to consider in our model:

1. Symmetric retail structures
   (a) Two small retailers (one selling \( A \), the other selling \( B \)) at each location.
   (b) One large retailer (selling both \( A \) and \( B \)) at each location.

2. Asymmetric retail structures
   c. One large retailer (selling both \( A \) and \( B \)) at one location, and two small retailers (one selling \( A \), the other selling \( B \)) at the other location.

Retailers have no costs other than the prices paid to the manufacturers to obtain their products. Manufacturer \( i \) is assumed to produce at a constant marginal cost equal to \( c_i \) with no fixed costs. This set-up is illustrated in Figure 1.

Consumers are uniformly distributed with unit density along the Hotelling line \([0, 1]\). Each consumer has unit demand for product \( i \), with a reservation price equal to \( v_i \). (The reservation price may, among other things, reflect the quality of the product). Thus, apart from the issue of multi-product shopping that we discuss below, the products are independent in consumption. Every consumer incurs a transportation cost \( t \) per unit travelled to visit a retail location, where \( 0 < t < v_i - c_i = \delta_i \).

There are two types of consumers buying each product: multi-product shoppers (multishoppers) and single-product shoppers (single-shoppers). A multi-shopper buys both products, \( A \) and \( B \), whereas a single-shopper is after one specific product only, either \( A \) or \( B \). Both types are assumed to be fully informed about the prices and the product
We let $\sigma \in [0, 1]$ be the share of multi-shoppers and $1 - \sigma$ the share of single-shoppers for each product. Hence, as long as the market is fully covered, there are $1 - \sigma$ consumers who buy product $A$, $1 - \sigma$ consumers who buy product $B$, and $\sigma$ consumers who buy both $A$ and $B$. Each of these three groups of consumers is assumed to be uniformly distributed on the Hotelling line.

Our assumptions about the two consumer types, and about their densities, warrant some further explanation: According to our assumptions, the total mass of consumers who buy at least one product is equal to $\sigma + 2(1 - \sigma) = 2 - \sigma$ and thus falling in the share of multi-shoppers. The main reason for this is that it secures the overall demand for each product being independent of the share of multi-shoppers in the market – i.e., total demand for product $i$ is always equal to $\sigma + 1 - \sigma = 1$ (as long as the market is covered, which is ensured by our assumptions). Hence, we can safely do comparative statics on $\sigma$, without mixing consumer preferences with market-size effects.

Another reason, more founded in reality, is that, when we think of an increase in consumers’ tendency to engage in "one-stop shopping" or multi-product shopping, we think of the following scenario: On one hand, an increasing number of consumers try to limit the number of shopping trips per week, e.g., to save time and travel costs due to a busy work schedule. All else equal, this contributes to reducing the mass of consumers at each store at any given point in time. On the other hand, when reducing the number of trips per week, e.g., from two to one, consumers naturally have to buy more products.

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6Realistically, consumers do not have perfect information about the availability and prices of all goods. To what extent there should be any systematic differences one way or the other between different types of consumers, such as multi-shoppers and single-shoppers, is to us not obvious. To keep the analysis tractable, we therefore assume that all consumers have the same information.
on each shopping trip. All else equal, this will contribute to increasing demand for each product at any given point in time. Together, we assume that these two effects cancel out exactly, and that demand for each product therefore is constant in consumers’ shopping behaviour.\(^7\)

In addition to the demand from the consumers on the line segment \([0, 1]\), we assume that, at each location, each retailer holds some monopoly power over a very small number of consumers. We may think of these consumers as the retailer’s "backyard". We assume that these consumers are single-shoppers. We let \(\mu q(p_{ij})\) be the total demand from these consumers for product \(i\) at location \(j\), where \(\mu > 0\) is a very small value (tends to zero), and where \(q(\cdot)\) is a linear function with \(q(v_i) = 0\) and \(q'(x) < 0\). This assumption is included solely to obtain a unique equilibrium at the contracting stage, which is demonstrated in more detail in the Appendix. When solving the model, we will evaluate prices and profits as \(\mu\) tends to zero, hence the exact form of \(q(\cdot)\) is not important, as long as it is downward sloping and provides an interior solution for the price equilibrium.

To avoid issues related to market coverage, and to focus solely on the effect of multi-shopping versus single-shopping (i.e., the number of products bought on each shopping trip by the average consumer), we assume that all consumers on the interval \([0, 1]\) receive positive net utility from just visiting at least one location; hence, a consumer always visits one of the retail locations, even when not buying anything. This assumption may be justified, e.g., by consumers receiving utility from browsing the product assortment, or by utility accrued from other establishments/services, exogenous to the firms in our model, at the location.\(^8\)

Denoting by \(x \in [0, 1]\) a consumer’s address on the Hotelling line, we can write the utility of a single shopper at address \(x\), visiting retail location \(j\) to buy product \(i\), as

\[
U_s = u + v_i - p_{ij} - t |x - j|,
\]

as long as \(p_{ij} \leq v_i\), and \(U_s = u - t |x - j| > 0\) if visiting the location without buying

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\(^7\)Note that a consumer’s decision on whether to be a multi-shopper or a single-shopper is exogenous in our model. This decision involves a trade-off for the consumer; e.g., multi-shoppers may save on travel costs/time spent shopping, but may incur some disutility/hassling costs due to having to postpone consumption, or due to costs for the amount of planning required to organise weekly or even biweekly shopping trips. For this reason, it is not obvious why everyone should be a multi-shopper; even though a multi-shopper saves on travel costs, her total shopping costs, which includes planning and logistics, may be lower with "top-up" or single shopping.

\(^8\)Examples include utility from filling petrol at a petrol station, visiting a café, meeting people, enjoying the good weather, etc. The main point here is that there may be services creating "footfall" to a specific location, other than the retailers and manufacturers considered in our model.
(or if \( p_{ij} > v_i \)). Hence, if product \( i \) can be found at both locations, the demand from single-shoppers for product \( i \) at location \( j \) is equal to

\[
x_{ij} (p_{ij}, p_{ik}) = (1 - \sigma) \left( 1 - \frac{p_{ij} - p_{ik}}{2t} \right),
\]

If the product can be found at location \( j \) only, the demand from single shoppers is equal to

\[
x_{ij} (p_{ij}, v_i) = (1 - \sigma) \left( 1 + \frac{v_i - p_{ij}}{2t} \right).
\]

In the same way, the utility of a multi-shopper at address \( x \), visiting retail location \( j \), can be written

\[
U_m = u + \sum_{i \in A,B} (v_i - p_{ij}) - t|x - j|,
\]

as long as \( p_{ij} \leq v_i \) for \( i \in \{A, B\} \). Hence, if both products can be bought at each location, then demand from multi-shoppers for each product at location \( j \), is equal to

\[
X_j (p_{ij}, p_{hj}, p_{ik}, p_{hk}) = \sigma \left[ 1 - \frac{p_{ij} + p_{hj} - p_{ik} - p_{hk}}{2t} \right].
\]

To make the model simple and tractable, without significantly affecting our main results, we assume that, if a product is not stocked at both locations, a multi-shopper never makes two shopping trips to obtain both products. This assumption does not have any direct effect on equilibrium prices: When both products are sold at both locations, it is, due to shopping costs, optimal for a multi-shopper to visit one location only. However, it may affect out-of-equilibrium prices, such as when a retailer delists a product. If prices then are low enough, some multi-shoppers may, without additional assumptions, find it optimal to visit both locations (to "shop around") to obtain the two products at the lowest possible prices. Allowing for this kind of behaviour complicates the analysis without affecting the main message of our model in any significant way. Moreover, there may be good reasons for why this kind of shopping-around behaviour would not occur; e.g., it is likely that shopping or hassling costs are lower on the first trip, and higher for each additional trip. With this assumption, the demand from multi-shoppers for product \( h \) at location \( j \), when product \( i \) is not stocked at location \( j \), is simply

\[
X_j (\infty, p_{hj}, p_{ik}, p_{hk}) = \sigma \left[ 1 - \frac{p_{hj} + v_i - p_{hk} - p_{ik}}{2t} \right],
\]

whereas the demand from multi-shoppers for each product at location \( k \) in this case is
equal to

\[ X_k(\infty, p_{hj}, p_{ik}, p_{hk}) = \sigma \left[ \frac{1}{2} + \frac{p_{hj} + v_i - p_{hk} - p_{ik}}{2t} \right]. \]

The game consists of three stages. At stage 1, retailers at each location decide whether to form a single integrated shop (i.e., to merge), or to stay separated. If they decide to merge, they pay a small merger cost (set-up cost) \( \varepsilon > 0 \). At stage 2, each manufacturer, \( A \) and \( B \), engage in simultaneous bilateral negotiations with each of its two retailers – one at location 0 and the other at location 1. Negotiations are over two-part tariffs \( \{w_{ij}, F_{ij}\} \), where \( w_{ij} \) is the per-unit wholesale price paid by the retailer at location \( j \) for product \( i \), and \( F_{ij} \) is the fixed fee. Throughout the game, the contract \( \{w_{ij}, F_{ij}\} \) is assumed to be observable only to the manufacturer of product \( i \) and the retailer selling product \( i \) at location \( j \).

At stage 3, the retailers simultaneously set prices to compete in the downstream market. We assume that the retailers learn which negotiations have been (un)successful before competing, and therefore know whether their rival is carrying a specific product. (We also assume that retailers who have completed their negotiations successfully, do not renegotiate their contracts after observing breakdown in other negotiations.) The supply terms, on the other hand, are assumed to be always secret (i.e., retailers do not learn other retailers’ wholesale prices before competing in the downstream market). When solving the model, we therefore look for a Nash bargaining equilibrium, with unobservable contracts, defined as follows.

**Definition 1.** A bargaining equilibrium (with unobservable contracts) is a vector of supply contracts, \( \{w^*, F^*\} \), and Nash equilibrium retail prices induced by these contracts, \( p^* \), that 1) simultaneously solve the Nash bargaining solutions, and where, 2) \( \forall i \) and \( \forall j \), in the negotiation over \( \{w_{ij}, F_{ij}\} \), the other contracts \( \{w^*_{-ij}, F^*_{-ij}\} \), and the prices of other retailers, are treated as given.

This equilibrium concept focuses on pairwise deviations and requires contracts to be bilaterally optimal for each supplier-retailer pair, holding rival retailers’ and manufacturers’ prices and supply contracts fixed. Hence, in each pairwise negotiation, the manufacturer’s and the retailer’s bilateral joint profit is maximised, given the outcome of other pairwise negotiations, and given rival retailers’ choice of prices.

Letting \( Q_{ij} = x_{ij} + X_j + \mu q(p_{ij}) \) denote the demand for product \( i \) at location \( j \), we can write the profit of a single-product retailer selling product \( i \) at location \( j \) as

\[ \Pi_S^{ij} = (p_{ij} - w_{ij}) Q_{ij} - F_{ij} \]
whereas the profit of a multi-product retailer at location $j$, is written

$$\Pi_L = \sum_i \{(p_{ij} - w_{ij}) Q_{ij} - F_{ij}\} - \epsilon$$

The profit of each manufacturer can be written

$$\Pi_M = \sum_j \{(w_{ij} - c_i) Q_{ij} + F_{ij}\}, \ i \in \{A, B\}$$

With every retailer being a single-product retailer, a set of asymmetric Nash bargaining solutions is a vector of wholesale prices and fixed fees that maximize the Nash products,

$$N_{ij} = (\Pi_M^i - d_M^i (\backslash ij))^{\lambda} (\Pi_S^i)^{1-\lambda}, \ i \in \{A, B\}, \ j \in \{0, 1\},$$

where $\lambda \in [0, 1]$ is a measure of the manufacturer’s exogenous bargaining power vis-a-vis the retailers, and $d_M^i (\backslash ij)$ denotes the manufacturer’s disagreement profit in the negotiations with the retailer at location $j$ ($i$’s profit when negotiations with the retailer at location $j$ break down). (By $\backslash ij$ we mean ‘without $ij’.’)

Similarly, the Nash product when negotiating with a multi-product retailer instead can be written

$$N_{ij} = (\Pi_M^i - d_M^i (\backslash ij))^{\lambda} (\Pi_L^i - d_L^i (\backslash ij))^{1-\lambda}, \ i \in \{A, B\}, \ j \in \{0, 1\},$$

where $d_L^i (\backslash ij)$ denotes the multi-product retailer’s disagreement profit in the negotiations with manufacturer $i$ (the retailer’s profit when selling product $h$ only).

We will use $(n, n)$, $(n, m)$, $(m, n)$, and $(m, m)$ to denote the different market structures, which depend on whether a ‘merger’ $(m)$ or ‘no merger’ $(n)$ has occurred on either side of the downstream market. Hence, we may write the profit of a small retailer facing a large retailer on the opposite side of the Hotelling line, as $\Pi_S^i (n, m)$, and so on.

There is an implicit assumption here that a manufacturer is unable to commit to distributing its product via one retailer exclusively. Similarly, an implicit assumption is that it is not possible for a large retailer to commit to selling one product only. One justification might be that exclusive selling or exclusive purchasing could be deemed unlawful by competition authorities. In this case, the manufacturer is unable to credibly commit to exclusivity, since it is without an enforceable contract; if each retailer believes that the manufacturer is simultaneously negotiating a contract with the rival, then the manufacturer is effectively precluded from obtaining higher compensation from the retailer in exchange for a promise of exclusivity. The same restriction occurs in Hart and Tirole.
Note that we assume large and small retailers having the same exogenous bargaining power, $1 - \lambda$, against their manufacturer(s), and conversely that each manufacturer has bargaining power $\lambda$ against its retailers (whether large or small). It is perfectly conceivable for different manufacturers to have different exogenous bargaining powers towards their respective retailers, and, conversely, that different types of retailers have different exogenous bargaining powers towards their respective manufacturers. However, given that we are interested in how consumer behaviour and retailer size affect the bargaining outcome and the distribution of profits, we let the exogenous bargaining powers be symmetric across different types of retailers and manufacturers.\(^9\)

We look for a subgame perfect equilibrium of our game. Together, the assumptions above ensure that the bargaining outcome in our model has a very simple solution. Before we continue, the following result is very useful.

**Lemma 1.** *In every subgame, a bargaining equilibrium exists in which each retailer-manufacturer pair agrees on a unit wholesale price $w^*_i$ equal to the manufacturer’s marginal cost $c_i$, $i \in \{A, B\}$. As long as $\mu > 0$, the equilibrium with $w^*_i = c_i$ is unique.*

**Proof.** See Appendix.

Lemma 1 is a well known result in vertical models where manufacturer-retailer pairs negotiate over contracts that are unobservable to other market participants. It has been analysed in detail in several papers, including Cremér and Riordan (1987), Hart and Tirole (1990), O’Brien and Shaffer (1992), McAfee and Schwartz (1994), and others. In the literature, this issue is often referred to as just ‘the opportunism problem’.

### 3 Analysis

#### 3.1 No mergers

The fact that $w^*_{ij} = w^*_{ik} = c_i$, $i \in \{A, B\}$, in every subgame, greatly simplifies our analysis. Note also that we will evaluate all our results as $\mu$ tends to zero.

We solve the model backwards in the usual way, starting with stage 3. Suppose first that no retailers have merged at this stage. There are now two independent retailers selling different products at each location. Using Lemma 1 and differentiating $\Pi^*_S$ with

\(^9\)This approach is also used by Inderst and Shaffer (2007) and Inderst and Wey (2011).
respect to \( p_{ij} \), we obtain the following first-order conditions for optimal retail pricing at stage 3.

\[
\frac{\partial \Pi^i_j}{\partial p_{ij}} = \sigma \left( \frac{1}{2} - \frac{p_{A0} + p_{B0} - p_{A1} - p_{B1}}{2t} \right) + (1 - \sigma) \left( \frac{1}{2} - \frac{p_{ij} - p_{ik}}{2} \right) \cdot \frac{p_{ij} - c_i}{2t} = 0, \quad i \neq h \in \{A, B\} \wedge j \neq k \in \{0, 1\} \tag{2}
\]

In solving these equations, we obtain a unique price equilibrium where the retailers set the same prices on each side of the Hotelling line, \( p_A^* = t + c_A \) and \( p_B^* = t + c_B \). Hence, without any mergers, we find that retailers set the standard Hotelling prices at stage 3—which are independent of the share of multi-shoppers \( \sigma \)—and that each retailer earns the standard Hotelling profit, \( t/2 \), gross of any fixed fee.

Because wholesale prices equal marginal costs, we have that \( \Pi^i_M = F_{ij} + F_{ik} \) and \( d_M^i(\backslash ij) = F_{ik} \). Hence, the condition for maximisation of the Nash product with respect to \( F_{ij} \), simplifies to \( (1 - \lambda) F_{ij} = \lambda (t/2 - F_{ij}) \), which yields the same fixed fee in each negotiation, \( F^* = \lambda t/2 \). Theorem 10. We have the following result.

**Lemma 2.** As \( \mu \) tends to zero, in every subgame without mergers, each retailer earns profit \( \Pi_M^i(n, n) = (1 - \lambda) t/2 \), and each manufacturer earns profit \( \Pi_M^i(n, n) = \lambda t \).

Note that both prices and profits are independent of the share of multi-shoppers, \( \sigma \).

The intuition is straightforward: Suppose a retailer has half the market for ‘his’ product, e.g., as is the case when each retailer sets the standard Hotelling prices, \( t + c_A \) and \( t + c_B \).

If a retailer selling product \( A \) decides to reduce his price by \( \Delta > 0 \), he will increase his demand by \( \Delta (2t)^{-1} \) in the same way as in the standard Hotelling model. A certain number of the consumers attracted by the retailer’s price reduction, \( \sigma \Delta (2t)^{-1} \), will also buy from the other retailer (selling \( B \)) at the same location. However, since this does not benefit the retailer selling product \( A \), it should not be reflected in the price \( p_A^* \). Hence, prices and profits are independent of \( \sigma \).

### 3.2 One merger

Suppose the retailers at location \( j \) decide to merge at stage 1, while the retailers at location \( k \) decide to stay independent. Using Lemma 1 and differentiating \( \Pi_L^i \) with respect to \( p_{ij} \),
we obtain the following first-order condition for the multi-product retailer,

\[
\sigma \left( \frac{1}{2} - \frac{p_{ij} + p_{hj} - p_{ik} - p_{hk}}{2t} \right) + (1 - \sigma) \left( \frac{1}{2} - \frac{p_{ij} - p_{ik}}{2t} \right) \left(-\frac{p_{ij} - c_i}{2t}\right) = \sigma \frac{p_{hj} - c_h}{2t}, \quad i \neq h \in \{A, B\}
\] (3)

(The first-order conditions for the single-product retailers at location \(k\) remains unchanged in this situation.) Note the addition of \(\sigma \frac{p_{hj} - c_h}{2t} \geq 0\) on the right-hand side of the large retailer’s first-order condition. This immediately implies that, as long as \(\sigma > 0\), the multiproduct retailer sets its prices below \(t + c_i, i \in \{A, B\}\), in equilibrium. Moreover, since the multiproduct retailer sets a lower price and prices on opposite sides of the Hotelling line are strategic complements, the small retailers will have to respond by cutting their prices as well. Hence, the merger makes for tougher competition between the two retail locations.

We let \(p_i^*(m, n)\) denote the equilibrium price for product \(i\) for a big retailer competing against two single-product retailers. Similarly, we let \(p_i^*(n, m)\) denote the equilibrium price for the single-product retailer selling product \(i\) in this situation. Solving the system of first-order conditions, we obtain the following equilibrium prices and profits (before solving for the fixed fees):

\[
p_i^*(m, n) = t + c_i - \frac{2 + \sigma \eta}{1 + \sigma} \quad \text{and} \quad \Pi_L^*(m, n) = \frac{t (3 + 2\sigma)^2}{(1 + \sigma) (3 + \sigma)^2} - \sum_i F_{ij} - \varepsilon,
\]

\[
p_i^*(n, m) = t + c_i - \eta \quad \text{and} \quad \Pi_S^*(n, m) = \frac{9t}{2 (3 + \sigma)^2} - F_{ik}, \quad \text{for } i \in \{A, B\},
\]

where \(\eta = \sigma t / (3 + \sigma) > 0\).

A small retailer again earns nothing if the negotiations with its manufacturer break down. The large retailer, however, if the negotiations with manufacturer \(i\) break down, still earns some income from selling product \(h\). We can write the large retailer’s (disagreement) profit in this situation as

\[
d_L^i (\setminus ij) = \left( \sigma \left[ \frac{1}{2} - \frac{p_{hj} + u_i - p_{ik} - p_{hk}}{2t} \right] \right) (p_{hj} - c_h) - F_{hj} - \varepsilon
\]

(4)

The retailer at location \(k\) selling product \(i\) in this case obtains some market power over the single shoppers buying product \(i\). Hence, the profits of the single-product retailers at
location $k$ can be written

$$
\Pi^i_S (\langle ij \rangle) = \left( \sigma \left[ \frac{1}{2} + \frac{p_{hj} + v_i - p_{ik} - p_{hk}}{2t} \right] + (1 - \sigma) \left[ \frac{1}{2} + \frac{v_i - p_{ik}}{2t} \right] \right) (p_{ik} - c_i) - F_{ik}
$$

(5)

for the retailer selling product $i$, and

$$
\Pi^{hk}_S (\langle ij \rangle) = \left( \sigma \left[ \frac{1}{2} + \frac{p_{hj} + v_i - p_{ik} - p_{hk}}{2t} \right] + (1 - \sigma) \left[ \frac{1}{2} + \frac{p_{hj} - p_{hk}}{2t} \right] \right) (p_{hk} - c_h) - F_{hk}
$$

(6)

for the retailer selling product $h$. Differentiating (4)-(6) and solving the resulting system of first-order conditions yield the following disagreement profit for the large retailer:

$$
d^j_L (\langle ij \rangle) = \frac{t (3 + 2\sigma)(2 - \sigma) - \sigma \delta_i^2}{8t (3 - \sigma^2)^2} - F_{hj} - \varepsilon
$$

(7)

where we recall that $\delta_i = v_i - c_i > t$.

When the large retailer is not stocking product $i$, it loses all of its demand from the single-shoppers purchasing product $i$. In addition, it loses some demand from the multi-shoppers who seek out both products; depending on the consumers’ reservation price for product $i$, $v_i$, and depending on the price of product $i$ at location $k$, some of the multi-shoppers who ‘used to’ buy from the large retailer, are, to a greater or lesser extent, inclined to switch shopping location to obtain both goods. In doing so, these consumers take all of their demand (for product $h$) with them. Because of this, the large retailer’s out-of-equilibrium demand is decreasing in $\delta_i$, and therefore $d^j_L (\langle ij \rangle)$ is decreasing in $\delta_i$ as well. As the share of multi-shoppers decreases, so that $\sigma \to 0$, it is easy to see that $d^j_L (\langle ij \rangle) \to t/2 - F_{hj} - \varepsilon$, and that the disagreement profit becomes independent of $\delta_i$.

We can now write the condition for the fixed fee in the negotiation between the large retailer and manufacturer $i$ as

$$(1 - \lambda) F_{ij} = \lambda \left( \Pi^i_L (m, n) - F_{ij} - d^j_L (\langle ij \rangle) \right),$$

which yields the solution

$$
F^*_i (m, n) = \lambda \left\{ \frac{t (3 + 2\sigma)^2}{(1 + \sigma)(3 + \sigma)^2} - \frac{t (3 + 2\sigma)(2 - \sigma) - \sigma \delta_i^2}{8t (3 - \sigma^2)^2} \right\}
$$
In the negotiations with the small retailer, on the other hand, the condition is just
\[(1 - \lambda) F_{ik} = \lambda \left( \Pi_{ik}^s (n, m) - F_{ik} \right) \]
which yields the solution
\[F_i^* (n, m) = \frac{9t\lambda}{2 (3 + \sigma)^2}.\]
We have the following result.

**Lemma 3.** As \(\mu\) tends to zero, in equilibrium of the game with one merger, the profit of the merged retailer equals
\[\Pi_L^i (m, n) = (1 - 2\lambda) \frac{t (3 + 2\sigma)^2}{(1 + \sigma) (3 + \sigma)^2} + \lambda \sum_i \frac{(t (3 + 2\sigma) (2 - \sigma) - \sigma \delta_i)^2}{8t (3 - \sigma^2)^2} - \varepsilon,\]
whereas the profit of each single-product retailer is
\[\Pi_S^i (n, m) = \frac{9t (1 - \lambda)}{2 (3 + \sigma)^2}.\]

For all retailers, the merger has created more competition, and hence lower overall profits. Note, however, that this may benefit the merging parties: the maximum profit a manufacturer can extract from the (large) retailer is its incremental contribution to the retailer’s flow profit, which, in the case of one merger, is
\[\Delta_L^i (m, n) = \frac{t (3 + 2\sigma)^2}{(1 + \sigma) (3 + \sigma)^2} - \frac{[t (3 + 2\sigma) (2 - \sigma) - \sigma \delta_i]^2}{8t (3 - \sigma^2)^2}\]
which becomes equal to \(t/2\) as \(\sigma \to 0\). Note also that \(t/2\) is each manufacturer’s incremental contribution to a small retailer in the game without mergers. When the manufacturers have high bargaining power, the retailers would like to minimise each manufacturer’s incremental contribution, which – as long as \(\delta_A\) and \(\delta_B\) are not too high – can be done by merging. To see this, it is sufficient to note that \(i\)’s incremental contribution to a large retailer decreases in the share \(\sigma\) of multi-shoppers when \(\sigma\) is small (and \(\delta_A\) and \(\delta_B\) are not too high),
\[\lim_{\sigma \to 0} \frac{\partial \Delta_L^i (m, n)}{\partial \sigma} = -\frac{1}{6} (3t - \delta_i)\]
whereas a manufacturer’s incremental contribution to a small retailer in the game without mergers is constant and equal to \(t/2\). Hence, as long as \(\sigma > 0\), the retailers who decided to
merge at stage 1, may have gained profit in doing so. We can consider a simple numerical example to illustrate: Suppose $\lambda = 1$, so that the two retailers would have earned nothing without the merger. Suppose also that $\sigma = 1$, $t = 1$, and $\delta_A = \delta_B = 1 + s$. The profit of the merged retailer then equals

$$\Pi_L^* (m, n) = \frac{7 + 2s^2 - 16s}{32} - \varepsilon,$$

which clearly is positive as long as $s$ and $\varepsilon$ are not too high, and the merger would then be profitable.

### 3.3 Two mergers

Above we showed how it may be profitable for one pair of retailers to merge, given that the manufacturers’ bargaining power $\lambda$ is high enough. The question then becomes whether it can be profitable also for both pairs of retailers to merge – forming large retail units on opposite sides of the Hotelling line.

Suppose that two large retailers have been established. The first-order condition for a large retailer is given by (3) above. Imposing symmetry on (3) gives the following equilibrium prices and flow profits for each retailer at stage 3 (given that both products are distributed by both retailers)

$$p_i^* (m, m) = t + c_i - \frac{t}{\Gamma + \sigma}, \quad \text{and} \quad \Pi_L^* (m, m) = \frac{t}{\Gamma + \sigma} - \sum_i F_{ij} - \varepsilon.$$

The second merger creates even more competition among retailers, and they reduce their prices further in an effort to attract multi-shoppers to their locations. A comparison of prices shows that

$$p_i^* (m, m) < p_i^* (m, n) < p_i^* (n, m) < p_i^* (n, n) = t + c_i,$$

as long as $\sigma > 0$.

Suppose that the negotiations between manufacturer $i$ and the retailer at location $j$ break down at stage 2. The retailer’s (disagreement) profit $d_{ij}^L$ is then identical to expression (4) above, whereas the profit of the large retailer at the opposite end of the
Hotelling line now is

\[
\Pi_L^i (\ell ij) = \left( \sigma \left[ \frac{1}{2} + \frac{p_{hj} + v_i - p_{ik} - p_{hk}}{2t} \right] + (1 - \sigma) \left[ \frac{1}{2} + \frac{v_i - p_{ik}}{2t} \right] \right) \times (p_{ik} - c_i) \\
+ \left( \sigma \left[ \frac{1}{2} + \frac{p_{hj} + v_i - p_{ik} - p_{hk}}{2t} \right] + (1 - \sigma) \left[ \frac{1}{2} + \frac{p_{hj} - p_{hk}}{2t} \right] \right) \times (p_{hk} - c_h) - \varepsilon,
\]

By differentiating (4) and (8) and solving the resulting system of first-order conditions, we find that

\[
d_L^i (\ell ij) = \frac{(3t - \sigma \delta_i)^2}{18t} - F_{hj} - \varepsilon
\]

Hence, in each negotiation we have that manufacturer \(i\)’s incremental contribution is

\[
\Delta_L^i (m, m) = \frac{t}{1 + \sigma} - \frac{(3t - \sigma \delta_i)^2}{18t},
\]

which is decreasing in the share of multi-shoppers, as long as \(\sigma\) is not too large:

\[
\lim_{\sigma \to 0} \partial \Delta_L^i (m, m) / \partial \sigma = -(3t - \delta_i) / 3.
\]

We can now state the following result.

**Lemma 4.** As \(\mu\) tends to zero, in equilibrium of the game with two mergers, the profit of each retailer is equal to

\[
\Pi_L^s (m, m) = (1 - 2\lambda) \frac{t}{1 + \sigma} + \lambda \sum_i \frac{(3t - \sigma \delta_i)^2}{18t} - \varepsilon
\]

This profit is strictly positive when \(\lambda = 1\), given that \(\delta_A, \delta_B, \varepsilon, \text{ and the share of multi-shoppers, } \sigma, \text{ are not too large.}\)

Again we can construct a simple example to illustrate how mergers at both sides of the Hotelling line may form part of an equilibrium. Suppose \(\lambda = 1\), so that \(\Pi_L^s (n, n) = \Pi_L^s (n, m) = 0\), i.e., each pair of retailers earn nothing if they decide not to merge. Moreover, let \(t = 1\), \(\delta = 1 + s\), and \(\sigma = 1/5\). The profit of each retailer after two mergers is then equal to

\[
\Pi_L^s (m, m) = \frac{17 + 2s^2 - 56s}{450} - \varepsilon,
\]

which again is strictly positive as long as \(s\) and \(\varepsilon\) are not too large. Hence, a second merger would in this case be profitable.
<table>
<thead>
<tr>
<th>Location 0</th>
<th>Location 1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No merger (n)</strong></td>
<td><strong>Merger (m)</strong></td>
</tr>
<tr>
<td>No merger (n)</td>
<td>(2\Pi_s^* (n, n), 2\Pi_s^* (n, n, n))</td>
</tr>
<tr>
<td>Merger (m)</td>
<td>(\Pi_L^* (m, n), 2\Pi_s^* (n, m, m))</td>
</tr>
</tbody>
</table>

Table 1: The merger game

4 The merger game

Given the equilibrium profits at the pricing stage, from Lemmas 2-4, we can now analyse each retailer pair’s merger decisions at stage 1. If both pairs choose to stay separated, each pair earns the total profit of

\[2\Pi_s^* (n, n) = (1 - \lambda) t.\]

If one pair stays separated whereas the other pair chooses merger, then the pair that did not merge earns a total profit equal to

\[2\Pi_s^* (n, m) = (1 - \lambda) \frac{9t}{(3 + \sigma)^2} \]

whereas the pair that merged earns the profit

\[\Pi_L^* (m, n) = (1 - 2\lambda) \frac{t (3 + 2\sigma)^2}{(1 + \sigma) (3 + \sigma)^2} + \lambda \sum_i \frac{(t (3 + 2\sigma) (2 - \sigma) - \sigma \delta_i)^2}{8t (3 - \sigma^2)^2} - \varepsilon.\]

Finally, when both pairs choose to merge, each pair earns a profit equal to

\[\Pi_L^* (m, m) = (1 - 2\lambda) \frac{t}{1 + \sigma} + \lambda \sum_i \frac{(3t - \sigma \delta_i)^2}{18t} - \varepsilon.\]

These outcomes are contained in Table 1. We have already provided some numerical examples that show how both one and two mergers may occur in equilibrium. A more general result can be obtained for the case of symmetric products, i.e., when \(\nu_A = \nu_B\) and \(c_A = c_B\), so that \(\delta_A = \delta_B = \delta\). In the Proposition below, we focus on pure-strategy equilibria.
Proposition 1. Let $\delta_A = \delta_B = \delta$.

i) An equilibrium exists with only small retailers at both locations if and only if

$$\lambda \leq \frac{4t (3 - \sigma^2)^2 [t \sigma (3 + 3 \sigma + \sigma^2) + \varepsilon (1 + \sigma) (3 + \sigma)^2]}{(1 + \sigma) (3 + \sigma)^2 [\sigma \delta + t (\sigma - 2)(2 \sigma + 3)]^2 - 4t^2 (9 + 9 \sigma + \sigma^2 - \sigma^3) (3 - \sigma^2)^2} \equiv \lambda.$$

ii) An equilibrium exists with big retailers at both locations if and only if

$$\lambda \geq \frac{9t [t \sigma (3 - \sigma) + \varepsilon (1 + \sigma) (3 + \sigma)^2]}{(3t - \sigma \delta)^2 (1 + \sigma) (3 + \sigma)^2 - 9t^2 (9 + 2 \sigma^2 + 3 \sigma)} \equiv \bar{\lambda}.$$

iii) An equilibrium exists with a big retailer at one location and small retailers at the other if and only if $\lambda \leq \lambda \leq \bar{\lambda}$.

![Figure 2: Equilibria of the merger game.](image)

We illustrate the equilibrium outcome by plotting two curves, defined implicitly by $2\Pi^*_S (n, n) = \Pi^*_L (m, n)$ and $2\Pi^*_S (n, m) = \Pi^*_L (m, m)$, for the special case of $\delta = 1.1$, $t = 1$ and $\varepsilon = .01$; see Figure 2. For these parameters, all cases are represented. The chance that at least one pair chooses to merge increases with the manufacturers’ exogenous bargaining power. Intuitively, this happens for the reason that, when manufacturers have more bargaining power, retailers care less about the overall profit created in equilibrium,
as they can only demand a small portion of this profit. Instead they care more about minimizing each manufacturer’s incremental contributions, i.e., what they earn ‘in equilibrium’ relative to what they earn ‘out-of-equilibrium’ (when negotiations break down with either manufacturer); this can be done by merging, intuitively because large retailers are more aggressive in their pricing decisions ‘in equilibrium’ relative to ‘out-of-equilibrium’.

Notice also that the chance that at least one pair chooses to merge increases – at least initially – with the share of multi-shoppers. There are two effects: On one hand, more multi-shoppers reduce each product’s incremental contribution to a large retailer’s profit. The reason, as noted above, is that when consumers buy more than one product, a large retailer tends to compete more fiercely when selling both products than when selling only one of them – even if these products are independent. Hence, all else equal, producers extract less profit from large retailers. And this creates an incentive to create large retail outlets, as noted above.

On the other hand, as large retailers seek to internalize all of the demand externalities created by consumers’ tendency to buy more than one product, competition becomes tougher – and even tougher when both pairs choose to merge. This reduces the overall profit available to all parties. Hence, if there is a large amount of multi-shoppers, it may not be profitable for both pairs of retailers to set up a large outlet.

5 Conclusion

We have in this paper set up a simple model to discuss which conditions are conducive to the occurrence of big stores in an economy. We find that retailers’ buying power is crucial: a big store improves the retailers’ bargaining position, but when the latter is large at the outset, there is less need for the retailers to form a big store to get better contract terms. On the other hand, when retailers have less bargaining power, there is an incentive to create a big store. This incentive is, however, dampened when such a big store already exists, particularly if there are many one-stop shoppers around, since competition between two big stores is particularly fierce in such a case.

There are several extensions one can conceive of that might affect details of the outcome. Some of these are to include variations in demand for the products across consumers, or variation in importance for consumers across products. Based on the, admittedly limited, experimentations we have done with such extensions, we have no reason to believe that the qualitative features of our results would be greatly affected.

More interesting, then, would be to consider what the response from the upstream
producers would be to the retailing formats chosen downstream. For example, one can envision producers merging in order to counter the formation of big stores downstream. Modelling this kind of upstream merger activity would be of interest in its own right, since it would serve as an explanation of conglomerate mergers, that is, mergers among producers of seemingly independent products.

A Appendix

Proof of Lemma 1. The proof consists of two steps.

Step 1. We start by noting that the optimal prices $p^*_A (w_A; w_B; p_A, p_B)$ and $p^*_B (w_B, w_A; p_B, p_A)$ for a multiproduct retailer have $\frac{\partial p^*_A}{\partial w_B} = \frac{\partial p^*_B}{\partial w_A} = 0$. I.e., for a multiproduct retailer, the optimal price for product $i$ depends on the retailer’s wholesale terms for product $i$ only – it does not depend on the wholesale terms for the retailer’s other product. This is easily checked by solving the retailer’s first-order conditions,

$$(p_A - w_A) \frac{\partial Q_A}{\partial p_A} + (p_B - w_B) \frac{\partial Q_B}{\partial p_A} + Q_A = 0$$

and

$$(p_A - w_A) \frac{\partial Q_A}{\partial p_B} + (p_B - w_B) \frac{\partial Q_B}{\partial p_B} + Q_B = 0$$

for $p_A$ and $p_B$ (holding fixed $p_A$ and $p_B$, and using the fact that $q(.)$ is linear).

Step 2. Consider first the case where all retailers are small retailers. Differentiating $N_{ij}$ with respect to $F_{ij}$, and simplifying, gives four first-order conditions:

$$(1 - \lambda) \left( \Pi^i_M - d^i_M (\setminus i) \right) = \lambda \Pi^i_j, \ i \in \{A, B\} \land j \in \{0, 1\}. \tag{A1}$$

Differentiating $N_{ij}$ in (1) with respect to $w_{ij}$, using (A1), and simplifying yield

$$\left\{ (p_{ij} - w_{ij}) \frac{\partial Q_{ij}}{\partial p_{ij}} + Q_{ij} \right\} + (w_{ij} - c_i) \frac{\partial Q_{ij}}{\partial p_{ij}} + (w_{ik} - c_i) \frac{\partial Q_{ik}}{\partial p_{ij}} = 0, \tag{A2}$$

$$i \in \{A, B\}, \ j \neq k \in \{0, 1\}.$$

The first-order condition for retailer optimality is

$$\frac{\partial \Pi^i_j}{\partial p_{ij}} = (p_{ij} - w_{ij}) \frac{\partial Q_{ij}}{\partial p_{ij}} + Q_{ij} = 0, \ i \in \{A, B\}, \ j \in \{0, 1\} \tag{A3}$$
By using (A3), condition (A2) simplifies to
\[
(w_{ij} - c_i) \frac{\partial Q_{ij}}{\partial p_{ij}} + (w_{ik} - c_i) \frac{\partial Q_{ik}}{\partial p_{ij}} = 0, \quad (A4)
\]
i \in \{A, B\}, j \neq k \in \{0, 1\},

or
\[
(w_{ij} - c_i) \left( \frac{\partial x_{ij}}{\partial p_{ij}} + \frac{\partial X_j}{\partial p_{ij}} + \mu q'(.) \right) + (w_{ik} - c_i) \left( \frac{\partial x_{ik}}{\partial p_{ij}} + \frac{\partial X_k}{\partial p_{ij}} \right) = 0, \quad (A5)
\]
l \neq k \in \{0, 1\}, i \in \{A, B\}

The system of equations in (A5) can be rewritten with matrix notation as
\[
\begin{bmatrix}
\frac{\partial Q_{ij}}{\partial p_{ij}} & \frac{\partial Q_{ik}}{\partial p_{ij}} \\
\frac{\partial Q_{ij}}{\partial p_{ik}} & \frac{\partial Q_{ik}}{\partial p_{ik}}
\end{bmatrix}
= 0
\]
and
\[
\begin{bmatrix}
\frac{\partial Q_{ij}}{\partial p_{ij}} & \frac{\partial Q_{ik}}{\partial p_{ij}} \\
\frac{\partial Q_{ij}}{\partial p_{ik}} & \frac{\partial Q_{ik}}{\partial p_{ik}}
\end{bmatrix}
= 0
\]

\(D_i\) is invertible as long as \(\mu > 0\), in which case the bargaining equilibrium with \(w_A^* = c_A\) and \(w_B^* = c_B\) is unique.

Suppose instead that there is a multiproduct retailer at one (or both) location(s). Differentiating \(N_{ij}\) with respect to \(F_{ij}\) gives the condition
\[
(1 - \lambda) \left( \Pi_M^i - d_M^i \langle \{ij\} \rangle \right) = \lambda \left( \Pi_L^i - d_L^i \langle \{ij\} \rangle \right), \quad i \in \{A, B\}, \quad j \in \{0, 1\} \quad (A6)
\]

Differentiating \(N_{ij}\) with respect to \(w_{ij}\), using (A6) and the result of Step 1, and simplifying give the condition
\[
\left\{ (p_{ij} - w_{ij}) \frac{\partial Q_{ij}}{\partial p_{ij}} + (p_{hj} - w_{hj}) \frac{\partial Q_{hj}}{\partial p_{ij}} + Q_{ij} \right\}
+ (w_{ij} - c_i) \frac{\partial Q_{ij}}{\partial p_{ij}} + (w_{ik} - c_i) \frac{\partial Q_{ik}}{\partial p_{ij}} = 0, \quad i \neq j \in \{A, B\} \quad (A7)
\]

The condition for optimal retail pricing by a multiproduct retailer, is
\[
(p_{ij} - w_{ij}) \frac{\partial Q_{ij}}{\partial p_{ij}} + (p_{hj} - w_{hj}) \frac{\partial Q_{hj}}{\partial p_{ij}} + Q_{ij} = 0, \quad i \neq h \in \{A, B\} \land j \in \{0, 1\} \quad (A8)
\]
By using (A8), we find that condition (A7) becomes identical to condition (A5) above. 
Q.E.D.

References


