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# Competition in Consumer Shopping Experience

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This paper analyzes the competitive role of retail shopping experience in markets with consumer search costs. We examine how a retailer's advantage in providing consumer shopping experience affects its equilibrium pricing and price advertising strategies. We find that if the consumer valuation of a shopping experience is sufficiently low, its effect on retailer strategy is similar to that of quality, and the retailer with the advantage in shopping experience then deploys higher levels of price advertising. On the other hand, when the shopping experience is valuable enough for consumers, it acts akin to price advertising in that it makes it optimal for the retailer with the advantage in shopping experience to eschew price advertising. The optimal competitive investments in consumer shopping experience can be higher than that of a monopoly. The profit impact of shopping experience for a retailer depends on the level of shopping experience: for low levels, the profit impact depends on the difference in the levels between the retailers, but for high enough levels, it depends only on whether the retailer's shopping experience level is higher than that of its competitor. In this case, even small differences in shopping experience levels can result in large differences in equilibrium profits.

*Key words*: shopping experience; retail competition; search costs; price advertising; store atmospherics; game theory
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## 1. Introduction

The creation of in-store shopping environments that enhance consumer shopping experience is recognized by retail practitioners as an important element of modern retail strategy. For example, a 2010 survey of 479 industry managers and participants conducted by RetailWire finds that in-store shopper experience is the most important driver of customer satisfaction ahead of product assortment, deals, and promotions.[1] Retailers make long-term investments in store atmospherics, which includes elements such as lighting, merchandising, music, salesperson attractiveness, entertainment, and even scent (e.g., dispersing fragrance in the air to make the shopping process enjoyable) (see, for example, Chapter 18 in Levy and Weitz 2009). Starting in the 1990s, this focus became exemplified by the increasing adoption of what the industry calls "entertainment retailing" by brick-and-mortar retailers. Successful retailers, such as FAO Schwarz or Toys "R" Us in toy retailing and REI in sporting goods, invest significantly in creating enjoyable experiences for shoppers, which can help bring more consumers to their stores.[2] Other retailers such as Home Depot, Pottery Barn, and Selfridges, who operate in highly competitive markets, use the strategy of entertainment and education (labeled by the industry as "edutainment") to bring potential customers to the store. Home Depot, for example, offers free home-improvement classes so that customers can learn how to use home-building and decoration supplies (supplies that are also available at competing stores such as Lowe's). Similarly, Pottery Barn has dedicated in-store decorating centers that conduct decorating events and classes.

This paper analyzes the effects of consumer shopping experience on the retail competitive strategies and identifies incentives for providing such value to consumers. Several important characteristics of the in-store shopping environment guide our analysis.

[1] For details, see Ball and Jones (2010). A 2002 industry study on customer relationship management in 10 U.S.-based retailers by the IBM Institute for Business Value indicates that in-store and person-to-person experience have significantly greater impact on satisfaction than other areas of investment, including pricing and value, marketing and communications, and data integration/analytics (Chu 2002).

[2] For example, consumers contemplating a visit to the FAO Schwarz flagship store in Manhattan can let their kids ride in the store's $300,000 three-dimensional motion simulator, watch dancers perform musical numbers on a giant piano keyboard, or let their child "adopt" a baby-doll (complete with adoption papers) in the store's nursery (Scardino 2005). Toys "R" Us reportedly spent $35 million in 2001 on its flagship Times Square store to make it the "personification of every kid's dream" (Prior 2001, p. 46).

Retailers make substantial and ongoing investments in creating enhanced store shopping environments with the goal of drawing customers to the store and inducing them to purchase. However, it is also apparent from the examples above that consumers can enjoy the shopping experience and entertainment even if in the end they do not purchase the product. In other words, unlike in the case of product quality, consumers can enjoy the consumption utility derived from the shopping experience even if they do not purchase anything from the retailer. This public good–like nature of shopping experience implies that consumers may free ride on a retailer's investments and enjoy the shopping environment without purchase—a behavior that is commonly referred to as "window shopping" or browsing. This raises the question of why retailers would prefer to use investments in shopping experience rather than use lower advertised prices in order to attract consumers to the store. In analyzing the effect of consumer shopping experience, we investigate the unique role played by this variable compared with other retail strategies such as pricing and price advertising. We then analyze the optimal retail investment strategies in making shopping more pleasurable to consumers.

The analysis highlights the role of shopping experience when consumers have search costs of visiting the retailers and are uncertain about retail prices unless they make a shopping visit. In such markets, there is a potential for market failure; i.e., given the unobservability of prices, consumers may be averse to incurring the cost of going to a retailer, even though once at the store, they may obtain positive purchase utility. A retailer's strategy will therefore be affected not only by the incentive to compete for customers at the store but also by the incentive to draw customers to the store. Retailers can build store environments that provide significant shopping experience value observable to customers before they decide whether or not to incur the search costs. This may induce consumers to search because the shopping experience utility can compensate for the event that consumers do not obtain sufficient ex post purchase utility once they have arrived at the store. In addition, shopping experience may act as an instrument that helps the retailer compete for consumers from the rival retailer. On the flip side, if shopping experience investments are costly, retailers may face the drawback that consumers may free ride and consume the experience without purchasing the product. A formal analysis is therefore useful for understanding these trade-offs under competition and for determining the role of shopping experience investments.

When consumers have search costs and do not know the prices (unless they visit the stores), retailers can use another retail decision variable: price advertising. Indeed, the existing literature (e.g., Lal and Matutes 1994) has focused on the role of price advertising in inducing consumers to visit the store. Therefore, we investigate the role of shopping experience when price advertising is also possible. Accordingly, our model considers equilibrium price advertising and pricing strategies and how they depend on the retail shopping experience levels. We then consider the optimal investment in shopping experience, thus considering both price advertising and shopping experience as endogenous competitive instruments available to retailers.

The model considers two retailers competing in price, price advertising, and shopping experience. To consider the simplest possible market structure that allows for competition in the above variables, we initially assume that consumer preferences for the products are homogeneous and identical across the two retailers. All consumers have a common search cost for visiting a store or for going between stores, and they face uncertainty about the price at a store unless the store advertises it. We first examine the case in which the shopping experience levels of the firms are given and then the case in which firms endogenously choose the levels of shopping experience. We also extend the model to analyze the possibility that consumers are uncertain about the product fit independent across retailers. In this case, retailers are differentiated in the products carried, and so the analysis helps to highlight implications of retail differentiation on retail investment in consumer shopping experience.

Given the homogeneous market, in the absence of search costs, firms would face Bertrand competition and zero profits. With search costs, if firms advertise and eliminate consumer price uncertainty, the same outcome would ensue, but retailers would not be able to recoup the advertising expenses. Therefore, the optimal advertising strategy in the absence of shopping experience results in partial (probabilistic) consumer price information and a distribution of retail prices but still results in zero equilibrium profits *net* of advertising costs, as any positive profits would induce the retailer to advertise more. However, we show that if a retailer has an advantage in the provision of shopping experience value to consumers, it can make positive equilibrium profits even though this value is available to consumers irrespective of whether or not they purchase.

An interesting result that emerges from the analysis is the relationship between shopping experience and price advertising in competitive markets. Price advertising acts to attract consumers to the store as well as to remove consumer uncertainty about prices, but it does not provide any direct consumption utility. Shopping experience attracts consumers to the store but does not resolve consumer uncertainty about prices. Shopping experience is also unlike price advertising in that it creates direct consumption utility/value over and above the value of information. This raises the question of whether shopping experience has a role that is more similar to a quality improvement (which creates extra consumer utility) or to price advertising (which provides information). When the shopping experience levels of retailers are low, they do not fully compensate consumers for their search costs. Retailers therefore have to advertise prices in order to induce consumers to visit their respective stores. In this case, shopping experience acts akin to product quality valuations, and consequently, the retailer with the advantage in shopping experience advertises at a higher level. It turns out that this effect is discontinuous in the level of shopping experience: the retailer with just a slight advantage advertises with probability 1. In contrast, at sufficiently high levels, shopping experience acts as a substitute for price advertising and helps to draw consumers to the store. In this case, the retailer with the advantage does not advertise. However, the disadvantaged retailer still finds it optimal to advertise no matter how high its shopping experience level is, even if all consumers find it optimal to visit both stores to consume the shopping experience value. Thus our analysis describes the conditions when shopping experience acts like a substitute for price advertising as opposed to a complement.

Another important result is that when shopping experience levels are high enough, the advertising and pricing strategy depend only on whether or not the retailer has the higher shopping experience level and not on the level per se. This suggests that the competitive payoffs from shopping experience differ qualitatively from the payoffs from standard quality improvements. Unlike in the case of product quality, payoffs from shopping experience at high enough levels increase discontinuously when the shopping experience of a retailer exceeds that of the rival. Thus at high levels of shopping experience, the competition in this instrument is similar to what is observed in winner-take-all markets, in that even a small difference in the levels allows the firm with the higher shopping experience level to achieve disproportionately higher profits. Retailers compete for the order of consumer visitation. An implication of this is that firms may overcompete in shopping experience compared with the choice of a monopoly firm.

We then consider the case in which retailers make costly investments in the levels of shopping experience, thus endogenizing shopping experience levels. We find that when the cost of shopping experience is sufficiently high, the equilibrium in pure shopping experience strategies has the two ex ante similar retailers endogenously differentiating in their choices of shopping experience. This is reminiscent of the models of quality differentiation. There is also a symmetric equilibrium in mixed strategies. Furthermore, when the cost of shopping experience is sufficiently low, only the symmetric mixed strategy equilibrium exists. Therefore, competition in shopping experience is analytically distinct from quality competition (as in, e.g., Shaked and Sutton 1982, Moorthy 1988), where the differentiated pure strategy equilibrium always exists. Note that when shopping experience levels are high enough so that consumers will visit both stores regardless of purchase, the retail competition is for the order in which consumers would visit the stores, and the retailer with the higher shopping experience level will be visited first. This makes the payoffs from shopping experience investments for a firm discontinuous around the investment level chosen by the competitor (which is again in contrast to the payoffs from quality investments). This nature of the payoffs also points out the importance of competitive intelligence about the competitor's planned level of investment.

If consumers face uncertainty about product fit independent across retailers, then retailers are ex post differentiated in the products they offer. Therefore, one may expect the outcome of such competition to be between the outcomes of a monopoly and an undifferentiated competition. However, we find that shopping experience investments under some levels of product fit uncertainty, even in the absence of advertising costs, are higher than under the case of monopoly and the case of the undifferentiated retail competition. Furthermore, for an intermediate range of retailer costs of shopping experience, the optimal investment levels are, on average, higher than the socially optimal ones, even when advertising costs are absent.[3] This result supports the observation that retailers in such product categories as fashion goods or apparel, where fit is uncertain, invest more in enhancing shopping experience than supermarkets, which sell frequently purchased goods.

It is also useful to compare the competitive incentive to invest in shopping experience to the monopoly one. Although it is known that competing firms may

[3] When advertising costs are high, then the retailer (either in monopoly or in competition) could use shopping experience investment at a level that is at least sufficient to cover the consumer search cost in order to avoid advertising costs. Therefore when shopping experience costs are somewhat high as well, this investment could be higher than socially optimal if one assumes that a social planner need not advertise because she would set prices low enough. However, when price advertising has no costs, this result is no longer trivial and does not hold when retailers are not differentiated in the product fit.

overinvest in informative advertising, prior research (e.g., Tirole 1988) has also established the opposite in the case of product quality (i.e., competition may attenuate the incentive to invest in quality).[4] Our analysis of endogenous investments in shopping experience provides a useful perspective that complements the existing research. We show that competing firms may overinvest in shopping experience relative to a monopoly when shopping experience acts as a substitute for advertising. This is similar to the findings in existing research such as Grossman and Shapiro (1984). However, in contrast to the existing research, we show that in this case firms do not overinvest in shopping experience relative to what is socially optimal. This then also highlights our finding in the case of uncertain product fit that firms may overinvest in shopping experience relative to even the socially optimal level, but only when shopping experience acts as a substitute for quality improvement and not when it acts as a substitute for price advertising.

### 1.1. Related Research

This paper is related to the literature on retail strategies to promote store traffic and attract consumers to the store. Some of the early research in this area examined the phenomenon of loss leader pricing, i.e., pricing some products below marginal cost. Hess and Gerstner (1987) were perhaps the first to formally analyze loss leader pricing and provide a full information rationale for such practice. They considered consumers shopping at retailers selling two types of goods—impulse goods and shopping goods. The former are defined as those purchased "on sight" without any price comparison, whereas consumers conduct price comparisons for the latter. Hess and Gerstner show that retailers may price the shopping good below its marginal cost to attract consumers to the store and then recoup the profits through charging higher prices for the impulse goods.

Another important issue related to the store traffic is that consumers may not have information about retail prices without incurring a costly shopping trip. In this context, informative advertising (Butters 1977, Grossman and Shapiro 1984, Lal and Matutes 1994, Soberman 2004, Iyer et al. 2005, Amaldoss and He 2010) is a useful instrument because when consumers incur travel costs, the lack of retail price observability can lead consumers to not shop at all.[5] The closest approaches to our research are the models of price advertising in Lal and Matutes (1994) and Lal and Rao (1997). In their models, consumers are uninformed about prices unless they are advertised, and therefore consumer price expectations and advertising play a role in explaining loss leader strategies. Rajiv et al. (2002) investigated how the service/quality level of competing retailers is related to their price advertising levels. Lal and Matutes (1994) showed the existence of a loss leader equilibrium, in which both retailers advertise one of their goods at a low price and consumers rationally expect that the other good will be available only at the reservation price. Price advertising (of a sufficiently low price) attracts consumers to the store, but unlike shopping experience, it does not provide any direct independent-of-purchase consumption utility. Shopping experience enhancements attract consumers to the store by providing consumption utility, but they do not directly resolve consumer uncertainty about prices. Our analysis highlights the conditions under which shopping experience investments act akin to price advertising and help bring consumers to the store and the conditions under which they act similarly to product quality and help the retailer to charge higher prices.

Given the central role of consumer shopping costs and the lack of price information as a justification for shopping experience, our research also relates to the large literature on the role of search costs in competitive markets with imperfect price information. This literature starts with the seminal paper by Diamond (1971), which showed that in a homogeneous goods market with positive search costs, the only equilibrium is for all firms to charge the monopoly price and for consumers not to search. This result—that even very small search costs lead to a "no-trade" equilibrium—is known in the literature on search costs as the Diamond paradox. The argument for it is as follows: Suppose consumers search among the retailers sequentially and must pay a search cost $s > 0$ to learn a retailer's price. If the consumers expect the retailers to charge $p_e$, they will only visit a retailer if their product valuation is $V > p_e + s$. Once a consumer has arrived at a store, she will purchase the product if the price is less than $p_e + s$, because it is not optimal to incur an additional cost of $s$ to visit another retailer. Therefore retailers will always charge more than consumer expectations unless the price is constrained by the consumer valuation $V$. The only equilibrium is for consumers to expect $V$ and not visit any retailer even for very small search costs.

Not surprisingly, there is a significant line of research that proposes resolutions to this no-trade result through different mechanisms. These include product differentiation with uncertain match values (Anderson and Renault 1999), a variation in search technology such that more than one price could

[4] Brekke et al. (2010) show that competition could increase the supply of quality in the presence of income effects.

[5] Alternatively, Desai et al. (2010) considered the possibility that in the absence of retail price advertising, consumer valuations can be reduced as a result of consumers having to incur price discovery costs, and therefore retailers may have to lower prices.

be learned upon incurring the search cost (Burdett and Judd 1983), a consumer segment with zero search costs (Salop and Stiglitz 1977, Varian 1980, Narasimhan 1988), or retailer heterogeneity in information they have about consumer valuation (Kuksov 2006). In contrast to this research, the shopping experience mechanism in this paper is an endogenous firm strategy (like price advertising) that helps induce consumer search rather than resolve uncertainty. The agenda is therefore similar to the research examining other types of firm strategies. Such research includes Wernerfelt (1994b), who considered firms' colocation strategy as a mechanism to attract consumers with search costs and, more recently, Janssen and Non (2009), who analyzed the possibility of advertising informing consumers that a firm is selling a particular product at a certain price and therefore reducing the expected consumer search cost compared with a nonadvertising firm.

There is also a stream of research beginning with Telser (1960) on retailing services such as presale informational services, which consumers demand prior to purchasing. The key distortion highlighted in this research is the free-riding problem faced by retailers that invest in informational services: consumers could get the information necessary for making a purchase decision from a full-service retailer and then purchase from a discount outlet that does not provide informational services but offers a lower price (Mathewson and Winter 1983). More recently, Shin (2007) showed that free riding may actually end up benefiting the full-service retailer under competition.[6] Though shopping experience investments are also subject to free riding, their effects and the associated mechanisms are distinct from informational services in retail markets. First, unlike informational services, once the consumer is in the store, the shopping experience is not necessary for the consumer to make a purchase. For a consumer already in the store, the shopping experience provides a pure consumption utility that can be enjoyed independent of purchase. Second, because the consumption utility from shopping experience is observable before the consumers incur the search cost for the store visit, shopping experience can play a role that is akin to price advertising in motivating consumers to travel to the store even if the price or utility of the product is uncertain.

Note that there is also a clear distinction between shopping experience and the point-of-sale retail services that reduce consumer search costs or help consumers find the best product fit. Existing research has examined these services in the context of in-store sales assistance (Wernerfelt 1994a, Ofek et al. 2011), which can also be seen as mitigating the search costs of finding the correct product only after the consumer is in the store. However, unlike shopping experience, these point-of-sale services do not allow for the possibility of consumer free riding and do not provide consumers with observable independent-of-purchase consumption utility, which is the particular feature that allows shopping experience to compensate for the consumer cost of the shopping trip.

Finally, there is a substantial behavioral literature that investigates the role of sensory factors and the effects of atmospherics on consumer shopping behavior (for reviews, see Peck and Childers 2008, Turley and Milliman 2000). Much of this literature investigates the effects of specific sensory factors in the store environment such as music, smell, or color on key dependent variables such as consumer purchase behavior and the time spent in the store. Gorn (1982) showed that hearing pleasant music can significantly affect product evaluations, whereas later studies (e.g., Gorn et al. 1993) produced results consistent with Schwartz and Clore's (1983) *affect-as-information hypothesis*—that the mood created by music impacted upon product evaluations only when the subjects were not made aware of the source of their feelings. A good mood induced by music would affect product evaluations positively only if the consumers were not made consciously aware of the source of the mood.[7] This finding has obvious relevance for the use of ambient or background music in retail stores; studies such as Milliman (1982) and Baker et al. (1992) have shown that music as a store environmental variable impacts purchase behavior and the time spent in the store. Other studies such as Spangenberg et al. (1996) and Mitchell et al. (1995) have shown that the choice of the appropriate ambient scent can significantly influence sales, processing time, variety seeking, and the perceived time spent in a store. Taken together, these studies identify the effects of some relevant store atmospheric variables on consumer shopping behavior. Although our paper is about the competitive role of shopping experience as a retail strategy instrument, the behavioral literature can be seen as providing prescriptions for which type of in-store stimuli (e.g., music, taste, smell) could positively affect consumer perceptions and shopping behavior.

[6] The incentives to provide information have also been considered in the context of return policies (Shulman et al. 2011), quality information (Guo and Zhao 2009), and multichannel retailing (Ofek et al. 2011), as well as when competing firms have asymmetric quality levels (Kuksov and Lin 2010).

[7] Recently, Iyer and Kuksov (2010) examined firms' strategic choices to supply quality as well as activities that create mood or affect for consumers unable to fully separate the true-quality evaluations from their affect. Because of this information-processing problem, firms end up in equilibrium, choosing costly mood-creating activities even if they hold no direct consumption value for consumers.

## 2. Model

Consider two retailers, each selling a product to a market consisting of a unit mass of consumers. The marginal cost of the product for each retailer is constant and normalized to 0. Each consumer values the product of both retailers at $V$. Each consumer has single-unit demand and has to incur travel or search costs $s$ of visiting either store (from his or her home) or has to travel between the stores. Consumers observe the price offered if they incur the cost $s$ and are at the store or if the store has advertised its price (in which case they observe the price even if they do not incur the search cost). Consumers also have to be at the store from which they wish to buy; i.e., it is not possible for consumers to buy without incurring the search cost (and possibly without observing the price).

If retailer $j$ has the shopping environment to the extent of $m_j$, consumers will get a shopping experience utility of $m_j$ from that store if it is the first store they visit but only $\rho m_j$ if it is the second store they visit, where $\rho < 1$. The rationale for this assumption is that shopping activities involve physical fatigue or emotional satiation for enjoyment, which implies that consumers' enjoyment from the shopping experience at the second store is attenuated. Alternatively, a smaller value of $\rho$ might also capture the fact that the shopping experiences in different stores are closer substitutes and that consumers perceive less variety in the type of shopping experience across the stores.[8] We allow consumers to visit the same store more than once, but we will assume that consumers cannot "double up" on the enjoyment of the shopping experience by shopping at the same retailer more than once. This is reasonable because once a consumer comes to a retailer, she should enjoy the shopping experience until the marginal benefit of doing so is no longer positive. This would then imply that if the consumer returns to a previously visited store, there is no more residual enjoyment. The consumer may still consume the experience at a retailer not previously visited because the experience at a retailer is different from the experience at other retailers.

We assume that the shopping experience level of a store can be observed by consumers before they incur the search cost, whereas prices cannot be observed until consumers incur the search cost, unless the retailer advertised the price. The reason for this assumption is that shopping experience is a long-term decision that is not as easy to change as price (this is certainly true in decisions such as creating an attractive storefront, designing the physical layout and space, using infrastructure to create ambiance, hiring attractive salespeople, etc.). Thus the enjoyment a consumer has from the shopping experience at a particular store is more stable than prices, and therefore, over time, the consumer may have knowledge of the level of shopping experience but not of the easily changeable prices. Accordingly, we model a two-stage game in which the retailers first make the (long-term) shopping experience decisions, and then in the next stage, they make the (short-term) pricing decisions along with the decision on whether to advertise the price.[9] If a retailer advertises, consumers know its price before making the shopping trip; if it does not advertise, consumers only observe the price if they incur the search (travel) cost $s$ and visit that retail store. The cost of advertising (to the full market) for each retailer is $A$.

In many situations retailers must compete given predetermined levels of shopping experience. This could be due to constraints placed by historical corporate decisions or due to constraints placed by the nature of the retail site. Accordingly, we start with an analysis of retail price competition for given levels of $m_j$s. This then allows us to analyze how shopping experience interacts with price advertising to bring consumers to the store and to establish the role of shopping experience when prices can be communicated through advertising. We assume that $V$ is high enough relative to $s$ and $A$, so that even if $m_j = 0$, a monopoly firm would prefer to be in the market. In other words, a monopolist would prefer to advertise price $p = V - s$ and achieve unit sales rather than have zero sales and profits. The explicit condition for this is $V > A + s$.

As we have noted above, consumers observe $m_j$ of each store prior to deciding on the shopping trip and observe the price of store $j$ if and only if it advertised. Given this information, consumers maximize their expected utility by deciding whether or not to travel to the store(s) and whether or not to buy at a particular store. Note that consumers can enjoy the utility from the shopping experience $m_j$ either before or after

[8] The analysis holds for $\rho$ arbitrarily close to 1. However, $\rho = 1$ will result in multiple equilibria when both $m_j$ values are sufficiently high because then an arbitrary assumption can be made about which store the consumers will want to visit first. The assumption $\rho < 1$ forces consumers to prefer to visit the store with higher $m_j$ first if they are otherwise indifferent. This by itself seems a natural assumption and could be used as a refinement to analyze the case of $\rho = 1$. Substituting $\rho = 1$ in the equilibrium that we derive in this paper also leads to the equilibrium of the game with $\rho = 1$ that satisfies such a refinement.

[9] Although in some situations, one could assume that advertising is done in a stage prior to price selection, in the case of price advertising, the price has to be selected for it to be advertised. Therefore, we assume that the price and price advertising are decided at the same stage and simultaneously across retailers. Because of this, the price and advertising decisions of a given retailer can be (and in equilibrium, are) interrelated, but these decisions across the two retailers are independent.

purchase, and the utility received is not conditional on purchase. Therefore, the model allows for what is commonly called *window shopping*: i.e., a shopping trip made for the purpose of obtaining (nonpurchase-related) enjoyment at the retail location and without the intention (or sometimes even the possibility) of buying.

After considering the model with exogenous but possibly different across-retailer levels of shopping experience, we endogenize the levels of shopping experience. Specifically, we assume that in a stage preceding the price and price advertising choices, the retailers choose the levels of shopping experience, either simultaneously or sequentially. We assume that the cost of developing shopping experience at the level $m$ for either retailer is a fixed cost $cm^2$ independent of the number of units subsequently sold. This captures many of the important long-term investments in store appearance, layout, and store atmospherics variables such as merchandising, lighting, music, sales staff, and in-store entertainment activities that enhance consumer experience.

## 3. Analysis and Solution

Without loss of generality, we assume that $m_2 > m_1$, i.e., that retailer 2 has the advantage in retail shopping experience.[10] Let us denote retailer $j$'s price by $p_j$ and the probability of retailer $j$'s advertising by $\alpha_j$. As already noted, a retailer's pricing strategy is interrelated to its advertising strategy. We will show that in equilibrium, a retailer's pricing strategy involves random sales from a certain maximum price (i.e., a mixed strategy with a possible mass point at the top of the price distribution) either when the retailer advertises or when it does not, but not both. Let $M_j$ denote the mass point of retailer $j$'s mixed strategy at the top of its distribution, and let $F_j(p)$ denote the cumulative distribution function (cdf) of that distribution. At some value of price difference $p_2 - p_1$, consumers are indifferent between going to retailer 1 and retailer 2 on the first visit. When shopping experience levels are small enough so that consumers prefer to go to one retailer only, it is logical that the consumers prefer to go to the retailer with the higher shopping experience level, i.e., retailer 2, unless retailer 1 compensates for the consumer's lower shopping experience value with a correspondingly lower advertised price. As we will see from the subsequent analysis, this price difference is indeed positive in all cases, but it is not always equal to the difference $m_2 - m_1$.

### 3.1. Effect of Shopping Experience on Consumer Shopping Strategy

To determine the retailers' optimal price advertising strategy, it helps to first consider how shopping experience and advertising could influence the consumer shopping trip strategy. One can develop the logic as follows: If the level of shopping experience at both stores is low enough (namely, $m_j < s$ for $j = 1, 2$), consumers would only go to a retailer if they expect the possibility of buying there. The standard holdup argument presented in §1.1 then implies that consumers would expect any retailer that did not advertise to set a price that is too high for consumers to benefit from visiting that retailer. Therefore, in this case, price advertising is essential for a retailer to bring customers to its store and to possibly achieve positive sales. The optimal consumer strategy in this case is to decide, based on the retailers' price advertising (if any), from which store to buy while at home and to go only to the store that provides the higher utility (if this utility is positive). Note that the higher utility is determined by comparing $V - p_j + s + m_j$ for $j = 1, 2$.

At the opposite extreme, if shopping experience at each retailer is high enough ($\rho m_j > s$), consumers would go to both retailers regardless of their purchase intention. To obtain the highest total enjoyment from the shopping experience, consumers will prefer to first visit the retailer with the higher $m$ (retailer 2) and then the other retailer. In this case, if retailer 1 were to not advertise, consumers will infer that its price is at $V$, and therefore they will buy at retailer 2 as long as its price is below $V$. Therefore, retailer 1 will have to advertise in order to achieve positive sales. On the other hand, retailer 2 does not need to advertise because consumers will first visit this retailer regardless.[11]

In between the above two cases, consumers would like to visit at least one retailer for the shopping experience even if they do not expect to buy. Of course, if neither retailer advertises and consumers expect high prices ($p = V$ or slightly below), they will then visit the retailer with the highest $m$ (retailer 2). In contrast, suppose both retailers did advertise, and consumers having observed both prices decide that it is best to buy at retailer 1. Then if they only go to retailer 1,

[10] We do not explicitly consider the case of $m_2 = m_1$ because (i) as we will show in the following section, where the shopping experience levels are endogenous, the retailers' choice of $m_j$ will not result in $m_1 = m_2$ with positive probability; and (ii) the equilibrium in this case is not unique because the limit of the equilibrium strategies as $m_2 \to m_1$ is also an equilibrium for $m_2 = m_1$, and it is not necessarily symmetric. In other words, there are three equilibria for each $m_2 = m_1$, two of which are mirror images of each other and the third that is symmetric.

[11] Conceivably, retailer 1 could refrain from advertising in the hope that consumers would visit it first to make sure they are making the right choice of buying at retailer 2. But it is easy to see that this cannot be an equilibrium because it would then be optimal for retailer 2 to price just below $V$, and consumers would be strictly worse off sacrificing $(1 - \rho)m_2$ for such a strategy.

they obtain the utility of $V - p_1 + m_1 - s$; if they visit retailer 2 first (just for the shopping experience) and then retailer 1 (to buy the product and for the extra shopping experience), they will obtain the utility of $m_2 - s + V - p_1 + \rho m_1 - s$.[12] The second option above is preferred to the first one if and only if $m_2 > (1-\rho) \cdot m_1 + s$. Therefore, if this condition holds, retailer 2 will have no incentive to advertise, because even if consumers are convinced by retailer 1's advertising to buy there, they will still visit retailer 2 first (at which time they will know $p_2$ whether or not retailer 2 advertised), whereas retailer 1 does have the incentive to advertise (otherwise, consumers will not visit it after visiting retailer 2). If the above condition does not hold, then consumers will go to retailer 1 first if it advertises a sufficiently low price (relative to the expected or observed price at retailer 2). Therefore, retailer 2 also has the incentive to advertise. As we show in the analysis, the equilibrium in this case indeed involves both retailers advertising with positive probability.

To summarize the above discussion, we have the following possibilities of consumer shopping behavior as a function of the retail shopping experience values $m_1 < m_2$.

1. $m_2 < s$: Consumers compare values $V - p_j + m_j - s$ based on advertised prices and go to the retailer that provides the higher value (as long as it is positive).

2. $s < m_2 < s + (1-\rho)m_1$: If retailer 1 does not advertise, consumers will go to retailer 2. If retailer 1 advertises a price low enough relative to consumer expectation of the price at retailer 2 (which, of course, equals the actual price if retailer 2 did advertise), consumers only go to retailer 1 and buy from there.

3. $s + (1-\rho)m_1 < m_2$ and $\rho m_1 < s$: Consumers always go first to retailer 2 regardless of advertising and then go to retailer 1 if it advertised a low enough price.

4. $\rho m_1 > s$: Consumers always go to retailer 2 and then to retailer 1 regardless of advertising.

Given these optimal consumer strategies, retailers decide on the price and advertising strategies. The next section analyzes the equilibrium retailer strategies for each of the cases above.

### 3.2. Retail Price and Advertising Strategies

*Case* 1: $m_1 < m_2 < s$. As already noted, in this case, because the levels of the shopping experience for both retailers are lower than the search costs, consumers do not have the incentive to visit either of the retailers in order to just consume the shopping experience. Therefore, when retailer $j$ advertises, it will receive zero demand unless the price is at or below $\bar{p}_j = V - s + m_j$, and so this is the upper bound on retailer $j$'s advertised price. Further, if a retailer does not advertise, consumers will rationally expect a high price of $V$ and will not visit the store. Thus the retailer's demand and profit without advertising will be zero. When both retailers advertise, the one with the greater level of shopping experience (retailer 2) should have a higher profit, and so retailer 2's profit with advertising should be positive. This implies that retailer 2 strictly prefers advertising to not advertising, and hence, $\alpha_2 = 1$. Given this, retailer 1 will not advertise with probability 1 because doing so would lead it to price competition resulting in zero price and negative net-of-advertising profits (while retailer 2 would charge price $m_2 - m_1$ and achieve a profit of $m_2 - m_1 - A$). As we derive below, retailer 2's pricing strategy will involve a mass point $M_2$ at the top of its price distribution ($\bar{p}_2$), whereas retailer 1—when it advertises—will charge up to $\bar{p}_1$ but without a mass point.

Depending on the price advertising received, consumers will either compare the "offers" across the two retailers when both of them advertise or (if retailer 1 did not advertise) buy from retailer 2, which always advertises as long as it advertises a price at or below $\bar{p}_2$. Because the best offer is determined by comparing $V - p_j - s + m_j$ across the two retailers and to 0 (the outside option of not buying), a consumer prefers retailer 1 to retailer 2 if and only if $p_1 < p_2 - \Delta_m$, where $\Delta_m = m_2 - m_1$. The mixed strategy equilibrium is characterized by the following system of equations representing the indifference of retailers 1 and 2, respectively:

$$\begin{cases} (1 - F_2(p_1 + \Delta_m))p_1 - A = 0, \\ (1-\alpha_1)p_2 + \alpha_1(1 - F_1(p_2 - \Delta_m))p_2 - A \\ \quad = (1-\alpha_1)\bar{p}_2 - A. \end{cases} \tag{1}$$

The first equation represents retailer 1's indifference between advertising and not, and the second one represents retailer 2's indifference between pricing at the upper bound and a putative lower price. Solving (1), we obtain the equilibrium retailer advertised price strategies as

$$\begin{cases} F_1(p_1) = \dfrac{1}{\alpha_1} - \dfrac{(1-\alpha_1)\bar{p}_2}{\alpha_1(p_1 + \Delta_m)} \quad \text{for } p_1 \in (A, \bar{p}_1); \\ F_2(p_2) = \begin{cases} 1 & \text{at } p_2 = \bar{p}_2, \\ 1 - \dfrac{A}{p_2 - \Delta_m}, & \text{for } p_2 \in (A + \Delta_m, \bar{p}_2). \end{cases} \end{cases} \tag{2}$$

The above equilibrium price distribution for retailer 2 implies that there is a mass point $M_2 = A/\bar{p}_1$ at $\bar{p}_2$.

[12] Consumers could also consider buying at retailer 1 and then go to retailer 2 just for the shopping experience, but this option is dominated by going to retailer 2 first.

Retailer 1 advertises with probability $\alpha_1$ such that $\underline{p}_1 = \underline{p}_2 - \Delta_m = A$; therefore,[13]

$$\alpha_1 = 1 - \frac{A+\Delta_m}{\bar{p}_2} = 1 - \frac{A+\Delta_m}{V-s+m_2}. \tag{3}$$

In this case, retailer 1's advertising is complementary to its own shopping experience, and it increases with $m_1$ but decreases with the shopping experience level of the competitor $m_2$. Notice also that retailer 1 has zero expected profits but retailer 2 earns positive expected profit of $\Delta_m = m_2 - m_1$. Thus retailer 2's profit advantage results from the difference in shopping experience levels.

Given the assumption that retailers are not differentiated in the product dimension, and that one of them has a (strict) advantage in the shopping experience, it is not surprising that the disadvantaged retailer receives zero profits. Note that the disadvantaged retailer still operates with positive expected demand. Of course, one should not interpret this outcome as the prediction that one of the retailers in observed markets will end up having zero profit, as in practice the retailers are at least somewhat differentiated in the products they carry. In §6.1, we show how differentiation leads to positive profits for both retailers without invalidating the other predictions of our model.

*Case* 2: $s < m_2 < s + (1-\rho)m_1$. This is the case in which given no price advertising, consumers visit retailer 2 for the shopping experience. Furthermore, as argued above, the condition $s < m_2 < s + (1-\rho)m_1$ implies that $m_2$ is low enough so that if consumers are induced (by price advertising) to visit retailer 1 first, they will not go to store 2 just to consume the shopping experience. Because $m_2 > s$, one may presume that consumers could possibly go to retailer 2 even if it never advertises because retailer 1 does not always advertise. But this presumption would be invalid, because if retailer 2 does not advertise at all, then retailer 1 will advertise a price just below $V + m_1 - m_2$, and retailer 2 would never receive any demand. Hence, in the equilibrium, both firms will advertise with some positive probability.

In equilibrium, retailer 1 has zero expected profit (which is equal to the profit if it does not advertise), and retailer 2's indifference condition is given by equating the profit when advertising at any price to the profit when not advertising but charging $p_2 = V$ (in which case it has positive demand only when retailer 1 does not advertise).[14] Note that if retailer 2 does not advertise and retailer 1 does, retailer 1 can convince consumers to visit its store first as long as it sets the price at or below $\bar{p}_1 = V - \Delta_m$, which is therefore the highest price retailer 1 can advertise to obtain positive sales. Therefore, the equilibrium price and price advertising probabilities must satisfy

$$\begin{cases} (1-\alpha_2)p_1 + \alpha_2(1-F_2(p_1+\Delta_m))p_1 - A = 0, \\ (1-\alpha_1)p_2 + \alpha_1(1-F_1(p_2-\Delta_m))p_2 - A = (1-\alpha_1)V, \end{cases} \tag{4}$$

where the price distributions are conditional on advertising. To determine the advertising probabilities, note that at $p_1 = \bar{p}_1$, retailer 1 has demand equal to the probability that retailer 2 does not advertise and zero profit net of advertising (because it is indifferent between advertising or not), which yields $\alpha_2 = 1 - A/\bar{p}_1$. Further, retailer 2's lowest possible price must be higher than retailer 1's lowest possible price by $\Delta_m$, which then determines $\alpha_1$. Solving Equations (4) with the above conditions on $\alpha_j$, we obtain

$$\begin{cases} F_1(p_1) = \dfrac{1}{\alpha_1} - \dfrac{A+(1-\alpha_1)V}{\alpha_1(p_1+\Delta_m)} & \text{for } p_1 \in (A, V-\Delta_m), \\ F_2(p_2) = \dfrac{1}{\alpha_2} - \dfrac{A}{\alpha_2(p_2-\Delta_m)} & \text{for } p_2 \in (A+\Delta_m, V), \end{cases}$$
$$\text{with} \quad \begin{cases} \alpha_1 = 1 - \Delta_m/V, \\ \alpha_2 = 1 - A/(V-\Delta_m). \end{cases} \tag{5}$$

Substituting $\bar{p}_1$ in $F_1(p)$ above, we obtain that retailer 1 will have a mass point of $M_1 = A/(V\alpha_1)$ at $\bar{p}_1 = V - \Delta_m$. This mass point is consistent with the fact that upon advertising, retailer 2 will have a higher profit. Retailer 2 has no mass point at the top of its distribution of prices $\bar{p}_2 = V$. Substituting $\alpha_1$ into Equation (4), we obtain that the expected profits of the retailers in this case are the same as in the case $m_1 < m_2 < s$; i.e., $\pi_1 = 0$ and $\pi_2 = \Delta_m = m_2 - m_1$.

*Case* 3: $s + (1-\rho)m_1 < m_2$ and $\rho m_1 < s$. As reasoned before, in this case, consumers always go to retailer 2 first. Furthermore, if retailer 1 does not advertise, consumers buy at retailer 2 if and only if $p_2 \le V$ and

[13] Note that this equilibrium holds as long as $V > A + s - m_1$ (which was assumed), i.e., if it pays for the retailer with lower shopping experience to advertise if it were a monopoly.

[14] One could also imagine a possibility that when retailer 1 advertises some specific price, retailer 2 could charge a lower price in the hope that consumers will come to its store expecting to get this lower price even when it does not advertise. To show that such consumer behavior cannot be an equilibrium, consider the lowest price $p^*$ advertised by retailer 1 that results in consumers going to retailer 2 first (of course, $p^* < V$, because advertising a price at or above $V$ has no benefit for the retailer). Given this, retailer 2 knows that if a consumer came to its store, either she did not observe $p_1$ or she observed $p_1 \ge p^*$. Then retailer 1 will optimally set its price a shade lower than $p^* + s - \rho m_1$, which (under the conditions of the current case) results in the consumer being strictly worse off from visiting retailer 2 first instead of retailer 1 when observing $p_1 = p^*$. Therefore, there is no minimal advertised price $p_1$ at which, in equilibrium, consumers could go to retailer 2 first given that retailer 2 does not advertise. Therefore, if consumers go to retailer 2, then it implies that retailer 1 did not advertise, and then it is optimal for retailer 2 to set price $p_2 = V$.

do not visit retailer 1. When retailer 1 does advertise, consumers still visit retailer 2 first, but they buy there only if it is not better to go to and buy at retailer 1. It follows that consumers buy at retailer 2 when $p_2 < p_1 + \Delta_s$, where $\Delta_s = s - \rho m_1$ is the price difference under which consumers are indifferent between buying at retailer 2 once already there and making the additional visit to retailer 1 and buying there. This case is thus qualitatively different from the previous two cases because here consumers consider whether to buy at retailer 1 after they have already visited retailer 2, whereas in the previous two cases, consumers consider which retailer to visit before incurring any search cost.

Retailer 1's indifference between advertising and not and retailer 2's indifference between any feasible price and the price $\bar{p}_2 = V$ it can charge when the other retailer does not advertise implies

$$\begin{cases}(1-F_2(p_1+\Delta_s))p_1 - A = 0,\\ (1-\alpha_1)p_2 + \alpha_1(1-F_1(p_2-\Delta_s))p_2 = (1-\alpha_1)V.\end{cases} \tag{6}$$

Solving the above system, we obtain

$$\begin{cases}F_1(p) = \dfrac{1}{\alpha_1} - \dfrac{(1-\alpha_1)V}{\alpha_1(p+\Delta')} & \text{for } p \in (A, V-\Delta_s),\\ F_2(p) = 1 - \dfrac{A}{p-\Delta'} & \text{for } p \in (A+\Delta_s, V).\end{cases} \tag{7}$$

Finally, the equilibrium advertising level $\alpha_1$ is obtained from the condition that the lower bounds on the price distributions must differ by $\Delta_s$, which yields

$$\alpha_1 = 1 - (A+\Delta_s)/V, \tag{8}$$

and from the condition that at the upper bound $F(\cdot) = 1$, we obtain that price distribution of retailer 2 has a mass point of $M_2 = A/(V-\Delta_s)$ at $\bar{p}_2 = V$.

Thus in the current case, the retailer 1 and 2 profits are $\pi_1 = 0$ and $\pi_2 = A + \Delta_s = A + s - \rho m_1$, respectively. The key difference between this case and the previous ones is that retailer 2 saves on the advertising cost because it has such a high level of shopping experience that consumers always go there first, and it achieves discontinuously higher profits independent of shopping experience level.

*Case* 4: $\rho m_2 > \rho m_1 > s$. Finally, consider the previous case but when $\rho m_1 > s$. Now consumers will always visit both retailers just to enjoy the shopping experience utility. This represents consumer window shopping. Furthermore, since the condition $m_2 > s + (1-\rho)m_1$ always holds when $\rho m_2 > \rho m_1 > s$, consumers will always want to visit retailer 2 first (to consume the nondiscounted utility $m_2$) and then retailer 1. As in Case 3, retailer 2 does not need to advertise because price advertising does not have any incremental benefit for a retailer that is always visited by consumers first. Further, if retailer 1 does not advertise, it will have an incentive to set a higher price (because if a consumer reaches it without buying at retailer 2, the consumer would have to incur the search cost $s$ to go back).

In summary, consumer and retailer behavior is similar to that in the previous case, except that in this case consumers go to retailer 1 even if they have already purchased at retailer 2. Therefore, if retailer 1 advertises its price, consumers are indifferent between the two retailers only given equal prices. Similar to the previous case, we can solve for the equilibrium as follows:

$$\begin{cases}F_1(p) = \dfrac{1}{\alpha_1} - \dfrac{(1-\alpha_1)V}{\alpha_1 p} = 1 - \dfrac{(1-\alpha_1)(V-p)}{\alpha_1 p}\\ \qquad\qquad \text{for } p \in (A, V),\\ F_2(p) = 1 - \dfrac{A}{p} \quad \text{for } p \in (A, V).\end{cases} \tag{9}$$

It follows from the above that retailer 2 has a mass point of $M_2 = A/V$ at $\bar{p}_2 = V$. Retailer 1's equilibrium price advertising is $\alpha_1 = 1 - A/V$. The retailer, 1 and 2 profits are $\pi_1 = 0$ and $\pi_2 = A$, respectively. Compared with Case 3, here one can see that the profits are the same as the ones in the limit of the previous case as $\rho m_1 \to s$. Indeed, the last case is analogous to and can be recovered from Case 3 by noting that, in general, $\Delta_s = \max\{0, s - \rho m_1\}$ and so when $\rho m_1 > s$, $\Delta_s = 0$.

## 4. Effects of Retailer Advantage in Consumer Shopping Experience

Table 1 summarizes the equilibrium advertising strategies and profits as functions of shopping experience levels $m_j$ $(j = 1, 2)$. Before analyzing the effects of retailer advantage in shopping experience, it is useful to consider the benchmark case in which both

**Table 1 Equilibrium Price Advertising and Profits** $(m_1 < m_2)$

| Case | Equilibrium advertising | Equilibrium profits |
|---|---|---|
| $m_2 < s$ | $\alpha_1 = 1 - \dfrac{A + m_2 - m_1}{V - s + m_2}$ | $\pi_1 = 0$ |
| | $\alpha_2 = 1$ | $\pi_2 = m_2 - m_1$ |
| $s < m_2 < s + (1-\rho)m_1$ | $\alpha_1 = 1 - \dfrac{m_2 - m_1}{V}$ | $\pi_1 = 0$ |
| | $\alpha_2 = 1 - \dfrac{A}{V - m_2 + m_1}$ | $\pi_2 = m_2 - m_1$ |
| $s + (1-\rho)m_1 < m_2$ and | $\alpha_1 = 1 - \dfrac{A + s - \rho m_1}{V}$ | $\pi_1 = 0$ |
| $\rho m_1 < s$ | $\alpha_2 = 0$ | $\pi_2 = A + s - \rho m_1$ |
| $\rho m_2 > \rho m_1 > s$ | $\alpha_1 = 1 - \dfrac{A}{V}$ | $\pi_1 = 0$ |
| | $\alpha_2 = 0$ | $\pi_2 = A$ |

retailers offer zero shopping experience. In this case, if advertising costs are prohibitively high ($A > V - s$) and there is no price advertising, there will be a market failure leading to zero retailer demand and profits. Consumers will rationally expect the highest price $V$ and will therefore not want to incur the search cost to visit either retailer. However, if advertising costs are low enough ($A < V - s$), retailers will advertise with positive probability. If a retailer advertises in equilibrium with probability less than 1, the retailer must be indifferent between advertising and not. Therefore, its equilibrium profits in this homogeneous consumer market will be zero. It is also not possible in equilibrium for both retailers to always advertise, because if they do, the standard Bertrand argument applies, leading to zero prices and negative net-of-advertising profits. Therefore the symmetric equilibrium is such that both retailers advertise with positive probability lower than 1, which turns out to be $\alpha = 1 - A/(V - s)$.[15] In the extreme, if advertising costs are zero, both retailers always advertise, and the equilibrium profits are still zero because retailers compete head-to-head for all consumers.

This means that in a homogeneous consumer market with symmetric advertising costs, price advertising alone does not lead to positive equilibrium profits. This sets up the rationale for the use of shopping experience as a competitive tool in markets with unobservable prices and search costs. How does positive and asymmetric levels of shopping experience across retailers affect advertising decisions and profitability? We analyze this question in the remainder of this section and discuss the conceptual implications of the results derived in the previous section.

### 4.1. Shopping Experience and Price Advertising

Proposition 1 demonstrates the manner in which shopping experience interacts with price advertising and suggests when shopping experience should act as a substitute for price advertising as opposed to a complement.

[15] This can be derived as follows: Following the standard Diamond paradox argument presented in §1.1, if retailer $j$ does not advertise, it gets no demand and profits. Therefore, given advertising probabilities $\alpha_j$, the solution then is similar to one in Narasimhan (1988): with probability $1 - \alpha_{3-j}$ (i.e., that the other retailer does not advertise), any advertised retailer $j$'s price at or below $V - s$ results in sales to all consumers, whereas with probability $\alpha_{3-j}$, retailer $j$ sells to all consumers if and only if it advertises prices lower than the advertised price of retailer $3 - j$. The equilibrium pricing is then in mixed strategies with each retailer being indifferent between pricing at $V - s$ and lower prices, and the expected equilibrium profit of retailer $j$ must be the same as its expected profit at the price $V - s$, which is $(1 - \alpha_j)(V - s)$. To solve now for equilibrium $\alpha_j$, recall that if advertising is probabilistic, the advertising cost must be equal to the profit given advertising, i.e., $A = (1 - \alpha_j)(V - s)$, and thus, $\alpha_j = 1 - A/(V - s)$.

Proposition 1. (i) *For low levels of shopping experience* ($m_1 < m_2 < s$), *the advantaged retailer always advertises while the disadvantaged retailer advertises with some probability less than* 1.

(ii) *For intermediate levels of shopping experience* ($s < m_2 < s + (1 - \rho)m_1$), *both retailers advertise with a positive probability less than* 1. *Furthermore, the probability of advertising for each retailer depends only on the difference in shopping experience levels, not on their absolute levels.*

(iii) *Finally, when the shopping experience level of at least one firm* (*i.e., retailer* 2) *is sufficiently high* ($m_2 > s + (1 - \rho)m_1$), *the advantaged retailer never advertises, and only the disadvantaged retailer advertises with some probability less than* 1.

When the levels of shopping experience of both firms are sufficiently small, as in Case 1 ($m_1 < m_2 < s$), shopping experience alone cannot compensate for the search costs consumers incur to visit the store. This implies that both retailers have to advertise to bring consumers to the store. With the advantage, retailer 2 advertises with probability 1. Shopping experience levels in the presence of price advertising affect the at-home consumer value, which determines the consumers' decision regarding which retailer they visit and buy from. In this case, shopping experience acts akin to an improvement in product quality and allows retailers to charge higher prices. This is also consistent with the relationship between the equilibrium advertised prices and retailer 2's advantage in shopping experience $\Delta_m = m_2 - m_1$: the expected equilibrium price of retailer 1 is decreasing in this advantage whereas that of retailer 2 is increasing. When shopping experience investments continue to be small but large enough for one firm that it can compensate for the consumer search costs as in part (ii) of Proposition 1, the equilibrium price and advertising behavior are qualitatively similar to the previous case. However, because retailer 2 can now also rely on shopping experience to induce consumers to come to its store, it need not always advertise its price.

When retailer 2 has a sufficiently high level of shopping experience as in part (iii) of Proposition 1, consumers will not only be ensured a high enough utility to compensate for their search costs, but they will also have the incentive to visit retailer 2 first in order to consume the undiscounted shopping utility there. Once consumers are at retailer 2, then depending on retailer 1's pricing and advertising strategy (and if $m_1 < s/\rho$), they decide whether to further travel between the retailers. Thus, because consumers will always visit retailer 2 first, it does not need to rely on price advertising to bring consumers there. So in contrast to part (i) of Proposition 1, retailer 2 does not advertise at all. The disadvantaged retailer 1 needs to advertise to induce consumers to buy at its store.

Finally, at the extreme of $m_2 > m_1 > s/\rho$, shopping experience levels are high enough not only to compensate consumers for the search cost of visiting each retailer but also to make traveling from any retailer to its competing retailer just to consume the shopping experience optimal. This characterizes window-shopping behavior on the part of the consumers. It is for this reason that equilibrium prices are independent of shopping experience levels. When the shopping experience level at a retailer is sufficiently large and higher than that at the other retailer, it substitutes for price advertising. Because shopping experience acts akin to price advertising in this case, higher levels of $m_j$ lead to lower mean levels of advertising spending in the industry.

Note that in the monopoly case, $m > s$ acts like advertising, whereas in the competitive case, only $m_2 > m_1 + \max\{0, s - \rho m_1\}$ has an effect on profits, which results from savings on advertising costs. One can also note that even though consumers search both stores in Case 4, and the market is fully homogeneous, the equilibrium does not end up being perfectly competitive. Further, even though consumers visit both retailers, the disadvantaged retailer 1 still finds it necessary to use price advertising to induce consumers to buy at its store.

### 4.2. Shopping Experience and Profitability

Another interesting implication of the advantage in shopping experience is that at high levels, an increase in shopping experience has discontinuous payoffs. More fully, the profit impact is summarized in Proposition 2.

Proposition 2. *The retailer with the advantage in shopping experience earns positive equilibrium profits. Furthermore, for low levels of shopping experience, the profits are continuous in the offered levels of shopping experience, but for high enough levels, a retailer's profits increase discontinuously when its shopping experience exceeds that of its competitor.*[16]

The presence of shopping experience investments leads to positive profits for the retailer with the advantage, whereas the profits of the disadvantaged retailer are competed away. For relatively low levels of shopping experience, retailer 2's equilibrium profit is precisely equal to the advantage in its shopping experience level over its competitor. The quality-like interaction between shopping experience (at low levels) and price advertising is further seen from the equilibrium profit functions in Table 1. One can observe that for small values of shopping experience, as represented by Cases 1 and 2 (when $m_j < s$ or $m_2 - m_1 < s - \rho m_1$), its effect on profits is similar to a quality improvement. For example, if we considered a model with no search costs, but consumer valuations for products at the two retailers are $V + m_1$ and $V + m_2$, where $m_1$ and $m_2$ can be seen as increases in quality, we would then obtain the same retailer profits as in Cases 1 and 2.

In contrast, when shopping experience levels are high enough as to draw consumers to the store, the difference in retailer profits (i.e., retailer 2's profit advantage) becomes a function of the advertising costs. This is most clearly seen in Case 4, where retailer 2's profit advantage is exactly equal to $A$. In this case, consumers shop around and visit both stores regardless of purchase. This free riding results in shopping experience levels having no effect on prices and profits as long as the order of these levels (i.e., which retailer has the higher level) is unchanged. Because consumers always shop around both retailers, retailer 2's profit advantage comes from its ability to outbid its rival in the pricing game. This, in turn, is dependent on how easily retailer 1 can advertise, i.e., on the level of its advertising cost.

An implication of the above analysis is that the competitive payoffs from shopping experience investments differ qualitatively from the payoffs associated with product quality investments. Specifically, a retailer's profit increases discontinuously by the order $A$ when its level exceeds that of the competitor. This is in contrast to when shopping experience is akin to product quality, in which case the firm's payoff increases continuously (and is the difference in the levels) when the shopping experience level exceeds that of its competitor. This discontinuous increase in retailer payoffs at high levels of shopping experience implies that even small differences across firms lead to significant differences in payoffs. This feature is reminiscent of the literature on rank-order tournaments (Lazear and Rosen 1981) and that on winner-take-all competition, where even small differences in input characteristics can lead to a disproportionately large difference in (output) payoffs for players. An implication is that firms might overcompete in shopping experience compared with the choice of a monopoly firm. The market outcome is not perfectly competitive despite the fact that consumers can shop around both retailers. Further, the fact that small differences in shopping experience can lead to significant differences in profits highlights the value of precise competitive intelligence and consumer research in the optimal design of the store environment. As the survey of retail industry managers conducted by RetailWire indicates (Ball and Jones 2010), the ability to properly design in-store shopper experience is one

[16] For an intermediate range of $m$ of the competitor, the retailer's profits discontinuously increase when its shopping experiences exceeds that of its competitor by a sufficiently high level (specifically, $s - \rho m_1$).

of the most important drivers of customer satisfaction in competitive retail markets.

We have considered a competitive environment where consumers face search costs and are uncertain about prices, and where retailers can use price advertising and shopping experience enhancements to attract consumers to the store. Whereas advertising a sufficiently low price acts to both attract consumers to the store and alleviate consumer uncertainty about prices, shopping experience enhancements only serve to attract consumers to the store and do not resolve consumer price uncertainty. The model captures consumer uncertainty about prices in the sense that although rational consumers can infer the equilibrium retailer strategies, the mixed pricing strategies employed by the retailers do not allow consumers to perfectly infer the price, and thus the strategies that resolve consumer uncertainty in this model serve not only the strategic (commitment) role but also an informative role. Alternatively, from the point of view of consumer utility (above and beyond the value of information), shopping experience creates consumption utility, whereas price advertising has no direct consumption utility. This evokes the question as to whether shopping experience is more similar to quality improvement (which creates consumer value) or to price advertising. As we argued above, the answer is that in some cases (namely, low levels of shopping experience), it acts like a quality improvement, whereas in other cases (high levels), it acts as a substitute for price advertising. This point may be seen as contrary to expectation, as it is precisely at high levels that shopping experience does not correlate with the price range or with the expected price charged by a retailer.

## 5. Optimal Investment in Shopping Experience

Consider now the endogenous choice of investments in shopping experience and assume that the costs of making these investments are increasing and convex and are given by the quadratic cost form $C(m) = cm^2$. In this case, retailers in a first stage make their shopping experience investments. Then in the next stage, these investments are observable to consumers as well as retailers, and the game proceeds as in the previous section, with retailers simultaneously choosing their advertising and pricing strategies. We now examine simultaneous retailers' investment in shopping experience levels and then ask how results would be different when the investments are made sequentially.

### 5.1. Simultaneous Investment

Simultaneous investment can also be interpreted as the case in which retailers decide on their investment in shopping experience without any knowledge of the plans of the competitor. In Proposition 3 we present the equilibrium in simultaneous investment strategies and the manner in which they depend on the cost of investment.

Proposition 3. *When retailers simultaneously choose their shopping experience investments, then*

(i) *When $c$ is sufficiently high,*[17] *there exist a symmetric mixed strategy equilibrium in which $m$ is uniformly distributed on $[0, 1/(2c)]$ and two pure strategy asymmetric equilibria in which one of the retailers chooses zero $m$ while the other one chooses $m$ at the level of $1/(2c)$ or $s$, depending on which one yields the higher profits.*

(ii) *When $c$ is sufficiently low, the unique equilibrium is the symmetric mixed strategy equilibrium in $m$. The probability with which $m > s/\rho$ is $\mathcal{P} = 1 - ((2c)/\rho)[(A+s) - \sqrt{(A+s)^2 - s^2/\rho}]$, and the equilibrium distribution of $m$ starts from a uniform distribution with density $2c$ on the initial interval $[0, \hat{m} = (1-\mathcal{P})/(2c)]$ and ends with a "triangular" distribution, which starts from $s/\rho$ and conditional on $m > s/\rho$, has cdf $G(m) = cm^2/(\mathcal{P}A) - (1-\mathcal{P})(4c(A+s) - \rho(1-\mathcal{P}))/(4c\mathcal{P}A)$.*

Proof. See the appendix.

When creating shopping experience is sufficiently costly for the retailers, there exist pure strategy asymmetric equilibria in which ex ante symmetric retailers endogenously differentiate in their choices of shopping experience in a manner reminiscent of the models of quality competition (e.g., Shaked and Sutton 1982, Moorthy 1988).[18] However, unlike standard quality competition, in this model there is a differentiated retail equilibrium (with positive demand for both retailers) even if the consumer market is homogeneous. The presence of consumer search costs for visiting retailers and the possibility of price advertising allows the firms to differentiate even in a market with homogeneous consumers, and the extent of retail differentiation in shopping experience can increase with consumer search costs. One can also see from part (i) of Proposition 3 that when the retailer's cost of shopping experience is sufficiently large, then the level of shopping experience can be decreasing in the extent of the retailer's cost $c$. In this case shopping experience has an effect that is similar to product quality improvements.

Given that the retailers are ex ante symmetric and that the retailer with the advantage in shopping experience earns higher profits, one may ask how, in practical terms, retailers could arrive at the asymmetric

[17] The explicit condition on $c$ is $c > \max\{1/(2s), (1/(2s^2))(A + \rho s + \sqrt{A^2 - s^2 + 2A\rho s})\}$.

[18] Here, retailers differentiate by providing more value, but they can also do so through reducing assortment (Dukes et al. 2009) or through providing bundle discounts (Balachander et al. 2010).

pure strategy equilibria in shopping experience. One way to understand this coordination issue is that retailers make initial plans regarding shopping experience, and as a result of some exogenous random shocks, one of the retailers is observed by both retailers as being ahead. This then leads to the expectation about which retailer would end up with the higher shopping experience. This expectation can also be formed through the knowledge of past behavior (which are presently payoff irrelevant) of the rival's managers or their background or temperament, or as a result of small differences in costs or initial "endowment" of entertainment.[19] This reasoning is the basis for the literature in marketing and economics that concentrates on considering pure strategy asymmetric equilibria in product quality/location strategies when they exist and even when the firms are ex ante symmetric (e.g., Shaked and Sutton 1982, Moorthy 1988, Kuksov 2004).

Consider now part (ii) of Proposition 3, when the retailer's cost of shopping experience becomes sufficiently small. Now there exists only a symmetric mixed strategy equilibrium in shopping experience. Given the equilibrium in mixed shopping experience investment strategies, one may wonder about the interpretation of the assumption that consumers know $m_j$ but not $p_j$ (unless advertised). As we have already mentioned, shopping experience is a longer-term decision and not as easy to change (unlike prices), and so the randomization of shopping experience is completed and fixed before the pricing stage, whereas the pricing game can be seen as being short term and being played repeatedly.[20] To elaborate on the mixed strategy outcome in part (ii) of Proposition 3, consider when $m$ is sufficiently low and $m < s$. Then the profit of the retailer with the advantage is $m_2 - m_1$, and the probability density function of the mixed strategy has density $2c$ on an interval starting from 0, where the retailers are indifferent between investing at a given level or not investing at all. Retailers choose the higher levels of shopping experience $m > s/\rho$ with the probability $\mathcal{P}$. This probability of choosing higher shopping experience levels decreases as $c$ increases, and thus when the costs of shopping experience are sufficiently high, the equilibrium distribution of $m$ becomes uniform. As $c$ decreases, the width of the lower interval with uniform distribution decreases, and the firms choose higher levels of $m > s/\rho$ with greater probability and with the conditional cdf $G(m)$.

As one can see from Table 1, higher levels of shopping experience lead to lower average levels of advertising when the levels are high enough. The retailer with the higher level of shopping experience does not advertise at all, whereas the other firm advertises with some positive probability. Indeed, in this endogenous investment case, if the cost $c$ becomes sufficiently small (so that the probability of $m > s/\rho$ increases), then the firms advertise prices with lower probability. Taken together, these observations suggest an interesting implication for retail strategy: retailers that find it easier to supply shopping experience will likely use less price advertising as a competitive instrument to attract consumers to their store. Within an industry, the more upscale retailers that sell higher-margin assortments will likely have greater incentive and ability to invest in higher levels of shopping experience, and our analysis suggests that these are precisely the type of retailers that will use less price advertising. This is consistent with upscale department stores such as Nordstrom or Neiman Marcus using less price advertising than such retailers as Macy's or J.C. Penney.

In the equilibrium above, it is clear that when shopping experience levels are high and equal to $s/\rho$, consumers will visit both retailers. One can then question what the benefit of further increasing the level of shopping experience would be given that it is already high enough to attract consumers. The answer is simple: retailers now compete for the order in which consumers visit their stores. The retailer with the higher shopping experience level will be visited first, which then allows this retailer to preclude price advertising. The retailer with the lower level of shopping experience, who has lost the competition for the first visit, then responds in equilibrium by price advertising. Price advertising cannot change the order of consumer shopping visits, but it can convince consumers to postpone their purchases until they visit the retailer that advertises its price (if the price at the first retailer was not low enough).

It is also useful to compare shopping investment levels under competition to the equivalent case of a monopolist selling two goods. When the cost of shopping experience is sufficiently high so that in the equilibrium, the levels are below $s$, a monopoly would set its level to $1/(2c)$ for one good and 0 for the other, which is then the same as what is provided by the competing retailers. But when the costs of shopping experience are lower, then competing retailers may supply a level of shopping experience higher than that of a monopoly. Shopping experience now also acts like price advertising in inducing consumers to

[19] Of course, such behavior has to be an equilibrium; i.e., neither of them would want to deviate from their respective equilibrium strategies.

[20] Note that it is still appropriate to use a one-period pricing model as in the price promotions models of Varian (1980) and Narasimhan (1988), because without across-time interaction, the outcome of a repeated game would just be a repetition of the outcome of the one-period game, and the shopping experience value would then be known and fixed for each repetition.

visit the store. A firm facing competition—and aware of consumer search costs—cares about whether consumers would visit it first. Therefore retailers overcompete in the provision of shopping experience and provide higher levels when compared to what would be provided by a monopoly. Thus, in general, competitive retailers provide the same or higher levels of shopping experience compared with a monopoly. This comparison is also interesting in the context of consumers' potential free riding on the investments in shopping experience. One might ask whether this free riding might lead to lower investments in a competitive environment. The interesting conclusion is that competitive investments are higher than those of a monopoly precisely for the case when consumers actually do end up free riding on the retail investments in shopping experience. For low levels of shopping experience, consumers only visit the store with the intention to buy (and will always buy if they did visit the store). But for high levels of shopping experience, consumers visit the store even if they have already bought. As already indicated, this feature of free riding on retail shopping experience can be thought of as realistically capturing the notion of consumer window shopping. From Proposition 3, we note that the extent of window shopping can be represented by $\mathcal{P}^2$ or the probability with which both retailers will choose $m > s/\rho$. The extent of window shopping increases with the advertising costs. This is intuitive because as advertising costs go up, the retailers have the incentive to supply even higher levels of shopping experience, and this leads to higher incidences of consumers visiting a retailer just for the shopping experience. The extent of window shopping decreases with the extent of consumer search costs (as long as advertising costs are large enough) but increases when $\rho$ is higher (or in other words, consumers experience less fatigue when shopping across the stores).

### 5.2. Sequential Investments

The simultaneous timing assumption can also be seen as a process of shopping experience investments in which firms do not have information about their competitor's investment actions while making their decision. Frequently, however a retailer will have information on the investments made by an incumbent. Or one of the retailers might already have decided its layout or locate itself closer to complementary assets such as a popular café or movie theater. In these cases the sequential timing of investments seems to be more relevant. With sequential timing, the equilibrium is in pure strategies and asymmetric with the first mover choosing the higher investment level. When costs of shopping experience are sufficiently high, the equilibrium is the same as the pure strategy one reported in Proposition 3 for high $c$ (with the first mover selecting the positive level of $m$). However, when the cost of shopping experience is low, then there continues to exist a pure strategy equilibrium in which the retailers differentiate even more. In this case the retailers are able to invest at a level greater than $s/\rho$. The first retailer (say, retailer 2) then invests at a level such that retailer 1 does not have the incentive to "outbid" its investment. In this case, $\pi_2 = s$ and $\pi_1 = 0$, and so the profit advantage of the first mover is exactly equal to the search cost.

## 6. Extensions

In this section, we discuss some additional factors that are observed in retail markets where shopping experience plays a role, and we analyze how these factors influence the strategies of retailers.

### 6.1. Product Fit Uncertainty and Differentiation

Until now, the analysis assumed that retailers have undifferentiated products. We now ask how retail differentiation would affect our results. Furthermore, although we considered consumer uncertainty about prices, we did not consider uncertainty in consumer product valuations. Both of these possibilities can be jointly addressed by assuming that consumers face uncertainty about the product fit prior to their visiting a retail store. The fit is an independent variable across retailers and, like price, is known only at the point of purchase. Specifically, assume that the probability of fit of either product is $f$, so that upon inspection of the product at a retailer, with probability $f$, a consumer realizes that the product fits her preferences and thus has a value of $V$, and with probability $1-f$, the consumer realizes that the product does not fit and has a value of 0.

The analysis and the subcases of this model are similar to the subcases that we analyzed in §3, which is a special case of this model when $f=1$. To understand the relation of the outcomes with uncertain product fit to the previous outcome with $f=1$, it is useful to think of $s/f$ as the adjusted search cost when consumers are searching for a product (with uncertain valuations) at a retailer, whereas the search cost is $s$ if the consumers are contemplating a visit to the retailer in order to consume the shopping experience. The former is because when searching for a product, a consumer compares the search cost $s$ to the expected benefit of $f(V-p)$, which is equivalent to the comparison of $s/f$ and $V-p$. Further, for each retailer, a fraction of $(1-f)$ of consumers who did not find a fit at the rival retailer are potentially loyal consumers. Among these consumers, those who have not yet visited the retailer would have an expected valuation of $fV$, whereas those who have already visited know whether or not the retailer's product fits their preferences. Thus if $f(1-f)V$ is high relative to $A$ and $s$, then retail competition is not as intense, and both retailers will have positive profits regardless of the values of the shopping experience they provide to customers.

As we know from the main model, when the cost of shopping experience is high (so that the equilibrium levels of $m$ are below $s$), competition results in similar levels of shopping experience compared with a (two-product) monopoly. On the other hand, when the cost is low, competition results in choices of $m$ that are higher than that of a monopoly but lower than what is socially optimal. One could then hypothesize that in the model with uncertain product fit, the equilibrium shopping experience would be between that of the competitive and the monopoly cases and always below what is socially optimal. However, this hypothesis turns out to be not true. In fact, as long as $fV$ is high relative to $s$, uncertain fit may increase competing firms' incentives to invest in shopping experience, and the expected equilibrium investment in shopping experience can exceed not only the monopoly but also the socially optimal level. This happens for some parameter values when the cost of shopping experience provision is high enough (so that the equilibrium levels are below $s$). Specifically, we have the following result.

PROPOSITION 4. *When there is product fit uncertainty* ($f<1$), *the competitive incentive to invest and the equilibrium investment in m are not monotone in* $f$. *In particular, while* $m\to 0$ *when* $f\to 0$, *we also have that in some parameter range, the equilibrium investment in m is, on average, higher than both the monopoly and socially optimal levels. For example, for small enough A and large enough V and c (relative to all other parameters and* $1/f$), *the average expected equilibrium m is higher than the socially optimal one by* $(1-\rho)(1-f)/(4c)$.[21]

Consider the consumers' decision of which retailer to visit first for the case when they would not visit either retailer for the shopping experience utility alone. If both stores advertised, and consumers observe the prices, then they should plan their shopping strategy as follows: First, they should go to the retailer that provides the higher expected utility and buy there if the product is a fit with their preferences. If the product at the first retailer turns out to not be a fit, then they should go to the other retailer and buy there if the product there is a fit. This strategy is optimal as long as the prices are low enough, so that going to the rival store if there was no fit at the first store is optimal (which we have assumed holds in the equilibrium as long as the prices are advertised). The relevant condition for consumer indifference in the order of visitation is

$$\begin{aligned} &f(V-p_1)+m_1-s+(1-f)(-s+\rho m_2+f(V-p_2))\\ &\quad=f(V-p_2)+m_2-s\\ &\qquad+(1-f)(-s+\rho m_1+f(V-p_1)), \end{aligned} \tag{10}$$

which implies that the price differential that makes consumers indifferent is

$$\Delta_f=\frac{(m_2-m_1)(1-\rho+f\rho)}{f^2}; \tag{11}$$

i.e., the low-$m$ store must price lower by $\Delta_f$ to make consumers indifferent if both prices are advertised at levels sufficient enough to entice a consumer to visit the store instead of forgoing the purchase opportunity altogether. For example, when $\rho=f=1/2$, then $\Delta=2(m_2-m_1)$; i.e., the price differential needed for the low-$m$ store to entice consumers to visit its store first is twice as large as in the case of certain fit.

Given that a retailer benefits from attracting consumers to visit its store first, we have that when $f<1$, it is harder for a retailer to overcome the advantage in $m$ of competing retailer through charging a lower price. Therefore, the advantage in $m$ is more beneficial to the retailer when $f<1$, and under some parameter ranges, this may lead to investments that are greater than the socially optimal one.[22] Of course, when $f$ tends to 0, the consumer expected value $fV$ tends to 0 as well and eventually does not justify the expenditure on shopping experience; i.e., the arguments will no longer apply since $fV$ is not high enough relative to $A$ and/or $s$, and in this case, the optimal $m$ will tend to 0.

Whereas the main effects of consumers' shopping experience on the firm's strategy are robust to the fit uncertainty consumers face, Proposition 4 shows that competition can lead to excess investment in shopping experience when product fit is uncertain. Recall that the investment was never higher than the socially optimal level in the main model with perfect fit. Proposition 4 suggests that one can find excessive investment in shopping experience compared with the socially optimal level in retail environments where consumers are sufficiently uncertain

[21] As we have noted above, although there are pure and mixed strategy equilibria in $m$ when $c$ is large, the average expected equilibrium $m$ turns out to be the same in all equilibria. The optimal (two-product) monopoly $m$ is equal to the socially optimal one in this case.

[22] Note that for a full proof, one also needs to consider how the retailer's benefit of enticing consumers to come to its store first depends on $f$. This effect is a product of the market share benefit, which is $f-f(1-f)=f^2$ and the margin (which increases as $f$ decreases). Since $\Delta_f$ is of the order of $f^2$, the declining benefit from the market share effect would exactly cancel out the price advantage effect $\Delta_f$ if the margin effect were not to exist. Note that the margin effect comes from the incentive of each retailer to go after the $f(1-f)$ "loyal" consumers.

about product fit. This is consistent with the observation that stores in shopping malls, which sell product categories such as fashion goods or apparel (where fit is uncertain), invest more in atmospherics and consumer shopping experience than stores such as supermarkets, which sell frequently purchased goods (e.g., grocery products). For frequently purchased grocery products, although retail prices may not be observed without advertising, product values would be more certain for consumers.

### 6.2. Heterogeneous Product Qualities

The parameter $V$, which represents the valuation of the product, has been uniform across retailers. Let us consider how relaxing this assumption would affect the role of shopping experience and retailers' strategies. Accordingly, suppose that retailers are differentiated in quality, and the consumer valuation for the product quality at retailer $i$ is $V_i$.

We assume that consumers observe retailers' quality levels before the pricing stage, and so quality decisions are assumed to be more long term than the price, just as in the case of the shopping experience decision. Consumers know the quality before visiting the retailers but only know the price if it was advertised. Note that in the extension with uncertain fit, we had assumed that fit was not known before visiting the store. This is to account for the fact that whereas the overall quality of a store (e.g., Macy's and J.C. Penney versus Nordstrom and Neiman Marcus) is a long-term decision, the fit is product specific and short term.

At the one extreme, we have Case 1 of the main model, where the levels of shopping experience at both retailers are low enough so that they do not compensate for the search costs ($m_1 < m_2 < s$). In other words, the cost of shopping experience is sufficiently high enough. Recall that retailers now compete for the consumers at home to induce them to visit the store. If the high-quality retailer now also has the higher shopping experience (i.e., $V_2 > V_1$), then the equilibrium is similar to that in §3: the equilibrium profits are $\pi_2 = \Delta + \Delta_V$; $\pi_1 = 0$, where $\Delta_V = V_2 - V_1$ is retailer 2's quality advantage. Retailer 2's equilibrium profits now reflect the advantage not only in shopping experience but also in quality, and the two variables act in a similar fashion on profits. Further, as mentioned before, retailer 2—because of its higher profitability—always advertises, whereas retailer 1 advertises with probability less than 1. Suppose now that $V_2 < V_1$ and $\Delta_V < 0$, and the high-quality retailer 1 has a lower level of shopping experience (and $-\Delta_V$ now denotes retailer 1's quality advantage). The equilibrium now depends on the relative magnitudes of the quality and shopping experience advantages. If $-\Delta_V < \Delta$, then retailer 2's advantage in shopping experience dominates retailer 1's quality advantage, and the equilibrium profits are once again of the form $\pi_2 = \Delta + \Delta_V$; $\pi_1 = 0$. However, if $-\Delta_V > \Delta$ and if it is retailer 1's quality advantage that dominates, we have that $\pi_2 = 0$; $\pi_1 = -(\Delta_V + \Delta)$. The overall point is that advantages in shopping experience and quality are substitutes in retail profits, and the retailer with the greater overall advantage is the one that has positive equilibrium profits.

Next consider the other extreme of Case 4 ($\rho m_2 > \rho m_1 > s$) in which shopping experience levels at both retailers are so high that consumers visit them regardless of purchase. Now if $V_2 > V_1$, then the nature of the equilibrium is similar to the one in the basic model except that retailer 2's equilibrium profits also reflect the quality advantage ($\pi_2 = A + \Delta_V > A$; $\pi_1 = 0$). However, if $V_2 < V_1$, then we will still have that retailer 2 has higher equilibrium profits if the quality advantage for retailer 1 is not too high or $V_1 - V_2 < A$. In this case retailer 1 still advertises with probability less than 1, and the equilibrium profits are $\pi_2 = A + \Delta_V < A$; $\pi_1 = 0$. Notice, however, that retailer 2's profits are lower than $A$, reflecting retailer 1's quality advantage. In contrast, if retailer 1's quality advantage is sufficiently large and $-\Delta = V_1 - V_2 > A$, we have a (pure) equilibrium in which the high-quality retailer 1 can have higher equilibrium profits despite having a lower level of shopping experience. Given this high level of $V_1$, retailer 1 has the incentive to always advertise and charge a price of $-\Delta_V$, and the equilibrium profits are $\pi_1 = -(\Delta + A)$; $\pi_2 = 0$. The point is, despite the fact that retailer 2 has won the competition in having consumers visit its store first, retailer 1 has enough of a quality advantage to always price advertise and win over the consumers.

## 7. Discussion and Conclusion

Retail activities and investments that enhance the shopping experience of consumers are ubiquitous and an important aspect of competitive retail strategy. These investments range from store atmospherics variables such as lighting and music to providing enjoyable experiences through entertainment and education. And although the recognition of the importance of shopping experience and store atmospherics as a retail instrument dates back at least to Kotler (1973), to the best of our knowledge, there exists no research that analyzes the competitive implications of this element of retailing. In this paper we examine how retailer advantage in consumer shopping experience affects consumer shopping and competitive retail market outcomes.

We analyze two aspects of investments in shopping experience: First, retail investments in shopping experience have a public good–like nature and are subject to consumer free riding. Consumers can enjoy the shopping experience and entertainment opportunities even if they do not purchase the product. Second, if the role of consumer shopping experience is to attract consumers, then another commonly used strategy of price advertising would also perform this role for retailers. This raises the question of why retailers would prefer to use shopping experience investments rather than lower advertised prices to attract consumers to the store. In analyzing the effects of shopping experience, we investigate the role played by this variable compared with retail price advertising and highlight the essential economic differences between these variables. Whereas price advertising acts to attract consumers to the store by alleviating consumer price uncertainty, shopping experience enhancements only serve to attract consumers to the store but do not directly resolve consumer uncertainty about prices. Further, shopping experience investments create direct consumer utility, whereas price advertising has no immediate consumption utility. In this context, we ask the question as to whether shopping experience is more similar to price advertising or to quality improvement (which creates direct consumption utility).

Our analysis shows that if the consumer value of shopping experience is sufficiently low, its effect on retailer strategy is similar to that of quality, and then the retailer with the advantage in shopping experience also deploys higher levels of price advertising. On the other hand, when consumers value shopping experience at high enough levels, it acts akin to price advertising in that it makes it optimal for the retailer with the advantage in shopping experience to do away with price advertising. At high levels, competition in shopping experience has a winner-take-all characteristic, and a small advantage can lead to large increases in equilibrium profits. Upon considering the optimal investment strategies, we show that competitive investments in shopping experience may be higher than that of a monopoly when the costs are low enough. Further, there is a suggestion that competition can lead to greater investments in shopping experience compared with both the monopoly and the socially optimal levels in markets where consumers are sufficiently uncertain about product fit.

### 7.1. Empirical Implications and Research Possibilities

Our analysis of the interaction between shopping experience and other critical retail variables such as price advertising and quality provides testable implications for competitive retailing strategy. First, we find that when the cost of providing shopping experience goes down, or alternatively, when retailers find it easier (or have greater incentives) to supply shopping experience, then the incentives to deploy price advertising would decrease, and so retailers would advertise with lower probability. One way to empirically test this insight would be to identify across-market variations in cost and in ease of supplying shopping experience for retailers that operate in multiple markets. For example, the supply cost of shopping experience and entertainment may be related to real estate costs, the costs of hiring trained store staff, and the costs of operating experience-related activities, which can vary across different cities or markets. It might then be interesting to investigate how within-retailer pricing and advertising strategies interact with the provision of shopping experience across these markets.

A more nuanced prediction involves the correlation between which one of the competing retailers has the higher level of shopping experience and which one uses more price advertising. Our prediction is that this relationship is not monotonic: for low levels of shopping experience, the advantage in shopping experience would correlate positively with price advertising, whereas at the high enough levels, it would correlate negatively. Note that to test this prediction, one does not need to estimate the costs (or effectiveness) of price advertising and the investment in shopping environment. Instead, what one needs is a measure of what constitutes a high enough level of shopping experience as well as a measure of which of the competing retailers has the advantage in shopping experience. The latter could be potentially obtained through a survey, whereas an empirically measurable proxy for the former could be the propensity of consumers to window shop, i.e., visit a store without the intention to buy.[23]

The discontinuity of the advantage in shopping experience on profits could also be empirically tested through different specifications of the functional form of retail profitability as a function of the advantage in shopping experience and whether the level is high enough to result in window shopping. Note that in such an empirical analysis, one has to be careful about accounting for consumer heterogeneity in the enjoyment of shopping experience and shopping costs.

Our analysis also provides testable implications for how the degree of product fit uncertainty affects the

[23] Another prediction, albeit a more straightforward one, is that the extent of window shopping increases when shopping experience becomes easier to supply and also when the shopping environment is such that consumer enjoyment at the stores that are visited later is not significantly attenuated. Further, window shopping can increase as search costs go down or if the firms find it costlier to advertise. For an empirical analysis of this phenomenon, one may need observational or survey data that record consumers' shopping behavior (over and above the purchase decision) once they are in a retail location, data on retail pricing and advertising, and information on retail or mall characteristics.

competitive incentives to invest in shopping experience activities. As we argue in §6.1, one may expect retailers or shopping malls specializing in apparel and other goods—where fit is uncertain—to have higher incentives to invest in shopping experience. First, in the presence of product fit uncertainty, retailers would be more likely to overinvest in shopping experience activities in markets where they face competition compared with markets where they have monopoly power. Second, the increased incentive to provide shopping experience when fit is more uncertain could be seen as an interesting prediction by itself, because one could have hypothesized that the uncertain fit would facilitate search, and retailers would not need to invest in shopping experience.

The welfare implications of shopping experience investments also are interesting to investigate further. As we noted before, retailers' investments in shopping experience not only encourage search but also provide consumption utility independent of purchases. This latter aspect can lead to window shopping when retailers compete in the provision of store entertainment activities. An important policy matter is the optimality of the extent of window shopping from the social welfare standpoint and its implications for the household economy (for example, how it substitutes for other productive household activities). Empirical analysis of this phenomenon seems especially relevant for fast-growing retail markets in countries such as China and India, where, at least anecdotally, the consumption of shopping experience is on the increase.

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## Appendix

**Proof of Proposition 3(i).** When $m_1 < m_2 < s + (1-\rho)m_1$, then $\pi_1 = 0$; $\pi_2 = m_2 - m_1$. Retailer 2 would then maximize $\Pi_2 = m_2 - m_1 - cm_2^2$. Consider a candidate pair $m_2 = 1/(2c)$; $m_1 = 0$ as a possible equilibrium. This would be the case as long as $1/(2c) < s$ and if retailer 1 has no incentive to deviate from 0. Note that $1/(2c) < s$ implies $c > 1/(2s)$. Given $m_2$, retailer 1 has no incentive to deviate to any $m_1^d \le s$ as it makes negative profit. We can also rule out any deviation to $m_1^d > s + (1-\rho)/2c$ if $c > (A + \rho s + \sqrt{A^2 - s^2 + 2A\rho s})/(2s^2)$.

There also exists a symmetric mixed strategy equilibrium in $m$. Firm $i$'s profit function equals

$$\pi_i(m) = \int_0^m (m-x) f(x)\, dx - cm^2. \tag{12}$$

From the first-order condition $d\pi_i(m)/dm = 0$, we have that the symmetric equilibrium distribution is $F(m) = 2cm$ or that $f(m) = 2c$. The symmetric equilibrium distribution will not have any mass point, because otherwise, a firm can always deviate and move some of the mass to a slightly higher $m$ and be better off. The equilibrium profits can be derived by noting that the profits for every choice of $m$ in the strategy space should be the equal to that which is obtained for the choice of $m = 0$ and is therefore equal to 0. □

**Proof of Proposition 3(ii).** When $1/(2c) > s$ (or $c < 1/(2c)$), then there exists no pure strategy equilibrium. Consider the case in which the costs are so small that retailers can choose a level of shopping experience that ensures that consumers will visit the retailer regardless of purchase, or $m_i \ge s/\rho$. In this case, the mixed strategy equilibrium will include an interval that is close to 0—say, $[0, \hat{m}]$—as well as an interval $m_i \ge s/\rho$.[24] Let $\mathcal{P}$ be the probability of the firms choosing $m > s/\rho$. Given that in the symmetric equilibrium there are no mass points, the probability of $m = s/\rho$ is 0. As in part (i) above, in the interval close to 0, the payoff for retailer $i$ with higher $m_i$ is $(m_i - m_j)$, and the profit function is similar to (12). Then the distribution must have density $2c$ on $[0, (1-\mathcal{P})/2c]$ and probability $\mathcal{P}$ that $m > s/\rho$ with conditional cdf $G(m)$. We already checked the indifference between the points of the interval and 0. We can now write the indifference condition between any $m > s/\rho$ and $m = 0$ as

$$-cm^2 + \int_0^{(1-\mathcal{P})/2c} (A + s - \rho x)\cdot 2c\, dx + \mathcal{P}\int_{s/\rho}^{m} A\, dG(x) = 0. \tag{13}$$

From (13), we can obtain $G(m) = cm^2/(\mathcal{P}A) - (1-\mathcal{P})\cdot(4c(A+s) - \rho(1-\mathcal{P}))/(4c\mathcal{P}A)$. Then, $\mathcal{P}$ can be determined from the condition $G(s/\rho) = 0$, and we can derive it to be $\mathcal{P} = 1 - (2c/\rho)[(A+s) - \sqrt{(A+s)^2 - s^2/\rho}]$ □.

**Proof of Proposition 4.** To prove the proposition, it is enough to consider the equilibrium in the parameter range where $V$ and/or $(1-f)$ are high enough so that a retailer would always like to attract consumers who shop first at the other store and encountered lack of product fit there. In other words, we assume that the highest advertised price of retailer $j$ is at most

$$B_j = V - \frac{s - \rho m_j}{f}. \tag{14}$$

This pertains to the condition for maximum market coverage. We provide only the derivations for the case $m_1 < m_2 < s$, because that is enough to prove the claims in the proposition (of course, the equilibrium investment level will not fall out of this range when $c$ is high enough). The derivations in this case are similar to ones in the main model, and we can show that retailer 2 always advertises ($\alpha_2 = 1$), whereas retailer 1 will either advertise with probability less than 1 if $f(1-f)V < A$ or will always advertise otherwise. Recall that the price differential necessary to make consumers at home indifferent between going to retailer 1 first and going to retailer 2 first is derived in the

[24] Note that for simplicity of the analysis, we are assuming that $c$ is small enough so that there is no density on $s < m < s/\rho$.

main text as $\Delta_f = (m_2 - m_1)(1-\rho+f\rho)/f^2$ (note that this assumes that both retailers' prices are advertised at $B_j$ or below).

Consider first the case when advertising cost is high ($A > f(1-f)B_1$), so that retailer 1 does not always advertise. We have that $B_2 - \Delta_f < B_1$, and so the highest price of retailer 1 is then $\bar{p}_1 = B_2 - \Delta_f$, and the highest price of retailer 2 is $\bar{p}_2 = B_2$. Furthermore, similar to Case 1 of the main model, retailer 2 always advertises and has a mass point at $\bar{p}_2$, whereas retailer 1's pricing distribution has no mass points. The indifference between advertising/pricing and zero profits for retailer 1 and the indifference between different prices for retailer 2 lead to the following equilibrium conditions:

$$\begin{cases} f(1-F_2(p_1+\Delta_f))p_1 + f(1-f)F_2(p_1+\Delta_f)p_1 - A = 0, \\ f(1-\alpha_1)p_2 + f\alpha_1(1-F_1(p_2-\Delta_f))p_2 \\ \qquad + \alpha_1 f(1-f)F_1(p_2-\Delta_f)p_2 - A \\ \qquad = f(1-\alpha_1)\bar{p}_2 + \alpha_1 f(1-f)\bar{p}_2 - A, \end{cases} \tag{15}$$

where $\alpha_1$ is determined from the condition that the price at which $F_2(\cdot)=0$ is $\Delta_f$ higher than the price at which $F_1(\cdot)=0$. Solving the above equations, we obtain

$$\begin{cases} F_1(p) = \dfrac{1}{f\alpha_1} - \dfrac{\bar{p}_2(1-f\alpha_1)}{f\alpha_1(p+\Delta_f)} \\ \quad \text{for } p \in (A, \bar{p}_1), \text{ where } \alpha_1 = \dfrac{1}{f} - \dfrac{A - f\bar{p}_2}{f^2\bar{p}_2}; \\ F_2(p) = \dfrac{1}{f} - \dfrac{A}{f^2(p-\Delta_f)} \quad \text{for } p \in (A+\Delta_f, \bar{p}_2). \end{cases} \tag{16}$$

Furthermore, retailer 2 has a mass point of $M_2$ at $\bar{p} = V - (s-\rho m_2)/f$. Thus, in this case, the profit of retailer 1 is 0, and the profit of retailer 2 is $q\Delta_f$. To revisit the $V$ high enough condition, note that for the above to be the equilibrium, we need

$$V - \frac{s-\rho m_2}{f} > A + \frac{(m_2-m_1)(1-\rho+f\rho)}{f^2}$$

so that the lower bounds on the price distributions would be lower than $B_j$. This condition is satisfied when, say, $V > A + (m_2-m_1)/f^2$, or when $V > A + s/f^2$, for example. Also, for the maximum coverage condition to be satisfied, in addition to $V$ sufficiently high, $(1-f)V$ should be in the order of $(1-\rho)m$ or larger. One can show that if this is not true, the price distributions derived above would not be correct, but the profits would still be the same as derived above.

Now, consider the case when $A$ is low ($A < f(1-f)B_1$). Then, both retailers always advertise. In this case, retailer 1 has a mass point at its upper bound $\bar{p}_1 = B_1$, and retailer 2 also has a mass point at its upper bound $\bar{p}_2 = B_2$ (at the upper bound of its price distribution, retailer 2 receives the demand from consumers who went to retailer 1 first but did find product fit). Solving for the equilibrium price distributions in a manner similar to the above analysis, we obtain that the profit of retailer 1 is $f(1-f)\bar{p}_1 - A$ and the profit of retailer 2 is $f\Delta_f$ higher than that of retailer 1. Thus, the profits are

$$\begin{cases} \pi_1 = \max\{0, (1-f)(fV - s + \rho m_1) - A\}, \\ \pi_2 = \pi_1 + f\Delta_f = \pi_1 + \dfrac{(m_2-m_1)(1-\rho+f\rho)}{f} \\ \quad = \pi_1 + (m_2-m_1)\left(1 + \dfrac{(1-\rho)(1-f)}{f}\right), \end{cases} \tag{17}$$

as long as $V > A + s/f^2$.

To prove that the equilibrium investment in shopping experience may be above the socially optimal one, consider the equilibrium investment in $m$ when $A = 0$ and $V$ high enough. The above equation on equilibrium profits implies that the marginal benefit of increasing $m$ by $\delta$ for the retailer with the lower $m$ is $(1-f)\rho\delta$, whereas the benefit of increasing $m$ by $\delta$ for the retailer with the higher $m$ is $\delta(1-\rho+f\rho)/f$. Given the cost $2c\delta$ of increasing $m$, we then obtain that the symmetric equilibrium $m$ is uniformly distributed on $[(1-f)\rho/(2c), (1-\rho+f\rho)/(2fc)]$ as long as $c$ is high enough so that the equilibrium levels of $m$ do not exceed $s$. There is also an asymmetric equilibrium in pure strategies in which one retailer chooses $m = (1-\rho+f\rho)/(2fc)$ and the other chooses $m = (1-f)\rho/(2c)$. In all equilibria, the average across stores expected level of $m$ is the same.

Now, consider the optimal monopoly investment in $m$ when $A = 0$. To make the most efficient investments in shopping experience of the two stores under its control, it is optimal for the monopoly to induce all consumers to search in one store—say, retailer 2—first and search in retailer 1 only if they did not find product fit in retailer 2. Then the marginal benefit of increasing $m$ by $\delta$ in retailer 2 is the benefit of increasing price by $\delta/f$ while keeping the same sales of $f$; i.e., it is $\delta$. Therefore, the optimal $m_2$ for a monopoly is $1/(2c)$. For retailer 1, the benefit is one of increasing the price by $\rho\delta/f$ while keeping the same sales of $f(1-f)$. Therefore, the optimal $m_1$ for a monopoly is $\rho(1-f)/(2c)$.

Thus, the expected average $m$ under competition is larger than the monopoly average $m$ by $(1-\rho)(1-f)/(4c) > 0$. For example, when $c = 1$ and $\rho = f = 1/2$, the average competitive $m$ is 0.4375 and the average monopoly $m$ is 0.3125. Note also that the lowest competitive $m$ is the same as the lowest monopoly $m$, but the highest competitive $m$ is higher than that of monopoly. Finally, note that the monopoly provides the socially optimal level of $m$ in this case because the monopoly appropriates all the social surplus. □

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