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Online retailing boasts two major advantages: convenience of home shopping and easy access to information. In this paper, I argue that these two features have important implications for retailers' channel and advertising decisions. Two major questions are addressed: When should a conventional bricks-and-mortar retailer adopt a multichannel strategy? When should a multichannel retailer use its website to advertise offline prices? Analysis shows that the answers hinge on the nature of the product, the retailer's costs, and the competitors' strategies as well as the competitiveness of the market. Multichannel retailing is not necessarily the best strategy for all retailers; no adoption, asymmetric adoption, and symmetric adoption of the strategy are all possible equilibria. Advertising the in-store prices online is not always optimal. Price advertising in multichannel retailing has a different effect when compared with conventional single-channel retailing. It helps coordinate the channels by shifting the sales from online to offline, which is particularly useful when margins online are relatively low. The finding that multichannel retailers can benefit from drawing consumers back to physical stores highlights the risk of boosting online sales without considering the adverse effect on the offline channel and indicates a shifting role of the Web in retailers' businesses.

Key words: multichannel retailing; Internet; price advertising; distribution channel; channel coordination; game theory
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1. Introduction

Online retailing is changing the way retailers do business. From the consumers' point of view, online retailing has two major advantages over conventional bricks-and-mortar retailing. The first advantage is that it offers the convenience of home shopping, whereas in conventional retailing, consumers need to visit the store and pick up the goods. The second advantage is that the Internet offers easy access to information (Alba et al. 1997, Brynjolfsson and Smith 2000). The growing prevalence of broadband has helped the Internet become a mainstream information platform and advertising medium. The Internet is increasingly replacing more traditional sources of information such as television, newspapers, and magazines (Favier 2008). Many retailers use their websites to disseminate product and price information. In this paper, I argue that the convenience of the Internet as a shopping channel and its ability to provide price information have important implications for the way retailers coordinate their channels and compete and hence for the channel choices they make.

The term *multichannel retailing* is increasingly used to refer to the practice of retailers using both traditional bricks-and-mortar retail stores and the Internet to sell merchandise (i.e., the so-called "bricks-and-clicks" format). The addition of an online channel can help conventional retailers overcome geographic limits to serve consumers who are normally beyond the reach of their in-store services. The combination of complementary channels creates more contact opportunities and provides a greater mix of customer services that help improve retailers' capacity to better understand consumer behavior and enhance their overall value proposition. These benefits have motivated many retailers to capitalize on multichannel retailing to establish strategic advantages. In some categories, multichannel has become an overwhelmingly popular retail format. For example, almost all top department stores and electronics stores in the United States sell both online and offline. However, rather than try to promote online sales, increasing numbers of multichannel retailers such as Sears and Best Buy are beginning to use the website to boost their offline sales. Although multichannel was possibly the best and the most profitable model when the era of multichannel retailing had just started,[1]

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[1] For example, a research director at Gartner claims that "it [multichannel retailing] is absolutely the most profitable model" (Cooper 2001). Ernst & Young (2001) observes that "multichannel retailing is a compelling premise for every type of store operator in every product classification.... Clicks-and-mortar is no longer an option. It is an imperative."

whether this is still the case, when most competitors are already multichannel, is worth noting.

The adoption of multichannel strategy is more uneven in other retail categories. For example, in apparel, Esprit and Gap are multichannel, but T.J. Maxx and Ross are not. In the grocery sector, Tesco and Safeway are multichannel, but Kroger and Shaw's are not. In sporting goods, Sports Authority and Dick's are multichannel, but Big 5 and Hibbett Sports are not. In the convenience store sector, multichannel retailing is rarely adopted; major players such as Circle K and 7-Eleven sell only through the bricks-and-mortar channel. According to a Forrester Research study in 2004 (Chatham et al. 2004), only two-thirds of the top 100 retailers are multichannel. Why do some retailers adopt the multichannel strategy but others do not? What conditions are *not* optimal for multichannel retailing?

One of the retailers' major concerns is that an additional distribution channel may partly cannibalize the sales from existing channels rather than growing total sales.[2] Given the additional costs associated with delivery services and the fierce price competition online, retailers have realized that without an integrated strategy, store-based retailers seeking to boost sales through the Web risk simply shifting sales volume to the online channel and destroying overall profitability (Shi 2005). A further complication is that the Internet is not simply another channel through which to make transactions. It is very effective in providing information to customers to drive offline sales (Warshaw and Cana 2004). As more and more consumers frequently research products online and purchase them offline, the Internet affects more spending offline than online. Almost $400 billion of store sales—or 16% of total retail sales—are directly influenced by the Web, according to a Forrester Research report in 2007 (Mendelsohn et al. 2007). Should multichannel retailers take advantage of the information provision function of the online channel to promote their offline sales? Online information can be about product, price, service, and support (or any combination of these). In this paper, my concern is with price information. In this context, multichannel retailers face the decision of whether to utilize their online channels as one (additional) medium for price advertising. In practice, most multichannel retailers (e.g., Wal-Mart and Best Buy) have chosen to promote their in-store price information with online advertising so that consumers can check prices online before determining which channel best suits them; however, is it because advertising online is cheaper than using

traditional media or because of other reasons? Does advertising the in-store prices have the same effect on prices in multichannel retailing as in single-channel bricks-and-mortar retailing?

I aim to contribute a better understanding of retailers' channel and price advertising strategies in a multichannel context.[3] Specifically, I address two major questions: When should a conventional retailer adopt a multichannel strategy? When should multichannel retailers advertise their in-store prices using their online channels? To answer these questions, I develop a series of analytical models. The central part of this analysis is devoted to a duopoly model in which retailers' decisions are made in three stages. In the first stage, the two retailers decide whether to add an online channel to adopt a multichannel retailing strategy. In the second stage, they determine whether to advertise their in-store prices. When it is in their interest to do so, a conventional retailer will advertise using traditional means (e.g., store flyers, newspapers, etc.), whereas a multichannel retailer can use its store website as a (additional) medium. In the third stage, the retailers determine the price for the product on each channel, given the channel and advertising decisions. Thus the model entails endogenous channel advertising and pricing strategies, and allows one to answer the two questions above simultaneously. I explore the effect of cost on these decisions. I discuss how the results rely on the order of the decisions. I also extend the model to see how the results change with the number of retailers in the market.

I find strong justification for adopting a multichannel strategy in markets where the addition of an online channel can attract a great number of consumers who are otherwise not reachable by conventional in-store services. A conventional retailer cannot serve consumers located at a distance because their costs to travel to the store are too high. However, a multichannel retailer can serve them through online delivery services because the uniform delivered price subsidizes their travel costs. Consequently, consumers close to the local store buy from the offline channel and consumers at a distance buy from the online channel, dividing themselves according to their locations. Multichannel retailing is optimal because it not only expands the market but also enables the retailers to segment and better serve the customers who have different needs for shopping convenience.

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[2] About one-fourth of the retailers feared that online operations would cannibalize their bricks-and-mortar sales, according to an Aberdeen Group report in 2004 (Schuman 2004).

[3] This paper is concerned with retailers. Manufacturers can also take advantage of the Web to open a direct channel to end customers and to provide information. However, this situation involves the complicated issue of channel coordination because their decisions may have strategic impact on retailers' decisions. An analysis of such cases is beyond the scope of this research.

A retailer also prefers to advertise its (in-store) price to attract more consumers when an advertised low price can attract a large number of "new" customers. The lower the retailer's (marginal) cost, the greater the incentive the retailer has to advertise. The conventional bricks-and-mortar wisdom has it that price advertising results in higher consumer price sensitivity, lower prices, and thus greater market size (Kaul and Wittink 1995). In a multichannel context, price advertising works the same way but has a different effect. The advertised, and thus lowered, offline price draws back to the physical store consumers who would otherwise choose to buy online. This ability of price advertising to shift the sales from online to offline is particularly useful when the margin on the Web-based delivery services is relatively low.

Price advertising on the Web is likely to be cheaper than in traditional advertising media. However, this analysis suggests that low cost is not the major reason for the widespread practice of multichannel retailers using their websites to advertise in-store prices. Online advertising is preferable because, unlike price advertising in traditional media, a transactional website has the superior ability to provide price information for all the products the retailer carries and it effectively targets the online consumers. Therefore, it is more powerful in shifting the sales from online to offline. Because price advertising online can help coordinate the channels and alleviate the adverse effect of the online channel cannibalizing the sales from the conventional offline channel, the information provision function of the online channel can be a positive determinant for the adoption of a multichannel strategy.

This analysis shows that multichannel retailing and price advertising online, however, are not necessarily optimal for all retailers. From the consumer's point of view, delivery services are associated with consumer online disutility. From the retailer's point of view, delivery services incur e-fulfillment costs. For some goods, these disadvantages by themselves may be so severe as to rule out the Web-based delivery services as an equilibrium strategy. Moreover, the addition of delivery services intensifies price competition because product differentiation based on location vanishes online. The intensified price competition online not only results in severe cannibalization of the offline sales but also translates to the offline world and lowers profits there. In markets where the competition level is high and where the total size of the market is hard to expand, the loss from the adoption of a multichannel strategy can offset the gains. In such markets, a high-cost retailer does not see the value of adding an online channel. In contrast, a low-cost retailer may want to adopt the strategy because the latter can leverage its cost advantage and benefit more from

aggressive market expansion. The incentives to advertise also differ among competing retailers. A conventional retailer advertises to defend its market, whereas a multichannel retailer advertises only when its margin online is not high enough so that a shift of sales to the more profitable offline channel is desirable.

Retailers' incentives to expand to the online channel can be strengthened in an oligopoly market. I show that there is an equilibrium in which all retailers adopt the multichannel strategy and advertise their offline in-store prices, even when they differ in marginal costs. In this case, for many of the retailers, the adoption of multichannel strategy is not because the disadvantages disappear but because it is a strategy that has to be followed. The online presence helps keep their market share from shrinking, even though it may not be able to improve profitability.

In short, I show that multichannel retailing is not necessarily a profitable strategy for all retailers, and the information provision function of the online channel should not be used by every retailer. Rather, the optimality of the strategies hinges on the nature of the product, the retailer's cost, and the competitors' strategies as well as the competitiveness of the market. Channel coordination is vital for the success of multichannel retailing, and I show that successful coordination can be achieved by appropriate use of the price information provision function of the online channel. The finding that multichannel retailers can benefit from drawing consumers back to physical stores highlights the risk of simply boosting the online sales without considering the adverse effect on the offline channel and indicates a shifting role of the Web in retailers' businesses.

The remainder of the paper is organized as follows: Section 2 is devoted to a brief literature review. Section 3 describes the duopoly model and §4 develops the equilibrium strategies. Two extensions of the model, involving the case of an oligopoly market and the complementarity of advertising in various media, are presented in §5. Section 6 concludes with important managerial implications.

2. Literature Review

A retailer can benefit greatly from the adoption of multichannel strategy when its competitors are only bricks-and-mortar merchants. Yet is it still the case when they are all multichannel? Why do some retailers adopt the multichannel strategy and others do not? Should multichannel retailers advertise their in-store prices on the online channel? What is its impact? A better understanding of these issues has very important theoretical and managerial implications, but the literature generally does not address these questions.

There are a few theoretical analysis of competition between a pure-play Internet retailer and bricks-and-mortar retailer(s) (Balasubramanian 1998, Pan

et al. 2004), or between (duopoly) multichannel retailers (Lal and Sarvary 1999, Zettlemeyer 2000, Ofek et al. 2007), but none of these papers models the channel decisions. Because firms in their models come endowed with a channel strategy that they cannot change, these studies do not answer the question of why and under what conditions a multichannel strategy can be optimal. A few papers have explored endogenous online expansion but have taken the view of a manufacturer or emphasized other issues. For example, Chiang et al. (2003) and Kumar and Ruan (2006) look at a manufacturer's decision to complement its traditional retail channel with a direct online channel. Liu et al. (2006) study online expansion as a way for a retailer to deter possible entry of a pure-play e-tailer. These papers do not model multichannel retailing as an equilibrium result in a context where all retailers are allowed to choose to be conventional or multichannel.

One exception is Zhang and Moorthy (2007), who investigate duopoly retailers' endogenous channel decisions and the impact of retailers' vertical positioning on the adoption of multichannel strategy. However, they assume complete information, ignoring the information provision function of the online channel, which is a key factor considered in this paper. In addition, unlike this study they fail to explore the impact of retailer's costs, an important supply-side factor, on the adoption of multichannel strategy.

Information affects both consumer behavior and firms' performances, but the issues are not well studied in the context of multichannel retailing. The fact that consumer information search is much easier online than offline is captured by Zettlemeyer (2000) and Lal and Sarvary (1999), but these authors are concerned only with product information. In contrast, the present paper concerns price information. This distinction is important because, as Bakos (1997) and Lynch and Ariely (2000) have shown, price and product information provided online have different implications.

Price advertising has long been studied in literature; it is expected to increase customer price sensitivity and reduce prices (Kaul and Wittink 1995, Milyo and Waldfogel 1999). It also helps a retailer to commit to a low price (Lal and Matutes 1994). However, these theories about price advertising concern conventional retailing and do not provide a direct answer to the question of whether multichannel retailers should use their websites to advertise in-store prices. The present study shows that price advertising in multichannel retailing works the same way as in conventional single-channel retailing but has a channel-coordination effect. It can help draw online consumers back to physical stores when margins online are relatively low. Advertising the in-store
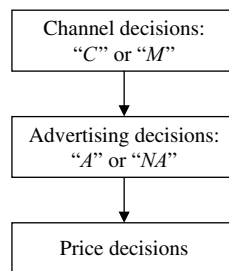
prices on one's own website is likely to be cheaper than using traditional media, but I argue that the low cost is not the major reason for its widespread use.

The present research is the first theoretical analysis concerning both retailers' channel and price advertising decisions. It explicitly incorporates both the convenience as well as the easy-access-to-price-information features of the online channel. Although the two advantages of the online channel have important implications and interact with each other in a complex manner, no existing study has modeled them simultaneously. I find that the information provision function of the online channel is a positive determinant for multichannel retailing because it improves channel coordination.

In conventional retailing, price advertising inevitably involves signaling issues because traditional media can only advertise a small number of selected products (Lal and Matutes 1994, Simester 1995). For example, a common store flyer advertises fewer than 200 products and prices but a typical Wal-Mart store stocks more than 150,000 products. A low-cost retailer can use an advertised low price to signal its low-cost type and thus low prices of unadvertised products (Simester 1995), but this strategy is costly because it often entails "price distortion" (Simester 1995, Kirmani and Rao 2000). This model stresses a distinctive and important aspect of price advertising on the Web. A transactional website can effectively advertise *all* the products the retailer carries (by adopting the same price policy). Hence, I abstract from price signaling issues (also note that retailers in this model sell the same product).

3. Model

Consider a market where two conventional bricks-and-mortar retailers are located at either ends of a Hotelling line, selling the same product and competing for the consumers in between. Each consumer demands up to one unit of the product, incurs a unit travel cost $t > 0$ for traveling to the store to shop, and has a willingness to pay $v > 0$ for the product. Consumers are of two types, *informed* and *uninformed*, both of which are uniformly distributed along the unit line. The informed consumers, a fraction of $(1 - \theta)$ of the population, are aware of the in-store price before making their shopping decisions (i.e., whether and through which channel to shop), where $1 \geq \theta \geq 0$. The uninformed consumers, a fraction θ of the population, are not aware of the in-store price before entering the (bricks-and-mortar) store unless it is advertised. The distinction between informed and uninformed consumers is made to capture the fact that some consumers are knowledgeable about the prices in a market—they have time to shop (or, their price search

Figure 1   The Game

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┌─────────────────────────┐
│   Channel decisions:    │
│      "C" or "M"         │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│  Advertising decisions: │
│      "A" or "NA"        │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│     Price decisions     │
└─────────────────────────┘
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Notes. Channel decisions: The retailers determine whether to adopt the multichannel strategy. (C, C): Both retailers adopt the conventional retailing strategy. (M, C): Only the high-cost retailer adopts the multichannel strategy. (C, M): Only the low-cost retailer adopts the multichannel strategy. (M, M): Both retailers adopt the multichannel strategy.

Advertising decisions: The retailers determine whether to advertise their offline in-store prices. (NA, NA): Neither retailer advertises. (A, NA): Only the high-cost retailer advertises. (NA, A): Only the low-cost retailer advertises. (A, A): Both retailers advertise.

cost is low) and have an interest in (comparison) shopping—although this is not true for other consumers.[4] I assume that the uninformed consumers have rational expectations of the unadvertised in-store prices to assist shopping decisions and their expectations are correct in equilibrium. This approach to modeling shopping behavior of consumers who have incomplete information about store prices has been used in the literature before; for example, see Lal and Matutes (1994) and Moorthy and Zhang (2006).

The retailers compete in a three-stage game as illustrated in Figure 1. In stage 1, the retailers simultaneously decide on the channel strategy. If a retailer chooses to be conventional (denoted by "C"), it has a bricks-and-mortar operation and expects consumers to visit and pick up the goods.[5] Alternatively, if it chooses to be multichannel (denoted by "M"), it offers the in-store services at the bricks-and-mortar store as well as delivery services in its online store.[6] I assume that the retailers carry the same product online and offline and maximize the total profit.

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[4] The sharp distinction between the two types of consumers serves to simplify the theoretical analysis. The model could have an extra fraction of uninformed consumers who do not observe the in-store price even when it is advertised or an extra fraction of consumers who do not observe the online prices. However, such a model would only complicate the analysis without providing any additional insight.

[5] A retailer's website can be used solely for information provision. In this case, the Internet is simply an (additional) advertising medium. I explore the more interesting cases where the Internet is both informational and transactional.

[6] In reality, a retailer can also choose to be a pure-play e-tailer. I, however, do not consider this option for two reasons. First, I want to focus on online retailing as a channel expansion strategy for conventional bricks-and-mortar retailers. Second, I want to focus on the use of retailers' websites as an advertising medium for in-store prices, which is not applicable to pure-play e-tailers.

The cost structures of online and offline retailing are different. For example, the infrastructure and inventory costs may be lower online than offline. However, I assume that the fixed costs of setting up and maintaining any retail channels are zero. The fixed costs do not affect this analysis because they do not affect the advertising and price decisions. More importantly, I want to focus on the retailers' strategic channel decisions. If the fixed costs were considered and were high enough, a retailer could be confined to being bricks-and-mortar only or pure-play online only, and then this model would reduce to one where the retailers come endowed with a channel strategy that they cannot change, as already been studied in the literature.

Online and offline retailing also differ in that the former involves a complex process of order fulfillment and thus incurs some significant *variable* costs. First, delivery services are an essential component of offering products online, in contrast to conventional retailing where the consumers need to bear the cost of traveling to a store and picking up the goods. "Picking, packing, and shipping" for small-sized individual customer orders are commonly cited as one of the most expensive and critical issues of online retailing. Second, many online retailers suffer a high ratio of contacts to orders; one order online may result in multiple costly customer contacts by email, phone, or letter. The third e-fulfillment service element concerns the handling of customer returns. Because customers cannot try and experience the product beforehand, online sales face particularly high return rates, which can easily destroy the economic viability of an online channel (Agatz et al. 2008). To capture these facts, I assume that the marginal costs are higher online than offline. I call these incremental marginal costs online the "delivery cost" for easy exposition and denote it as a constant $d > 0$.[7] Note that with this assumption, I implicitly focus on retail distribution of physical products (rather than digital goods such as air tickets, musical recordings, or publications, for which online distribution may be more cost efficient). Nevertheless, the results of this paper do not hinge on the assumption that the marginal cost is higher online than offline.[8]

In stage 2, the retailers simultaneously determine whether to advertise their offline in-store price(s).

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[7] The delivery cost d is assumed to be the same for the two retailers. In reality, retailers that have a cost advantage in the conventional channel are likely to maintain the advantage in the online channel as well, but the qualitative nature of the results does not change if this is assumed. (The proof is available from the author on request.)

[8] The results hold even when the marginal cost online is lower (i.e., when d is negative). For example, in Propositions 3–5, a multichannel retailer is better off advertising its in-store price as long as $|\mu + d|$ is positive, but not too large.

If the in-store price is advertised (denoted by "*A*"), it becomes observable to all consumers. Otherwise (denoted by "*NA*"), it is not accessible to uninformed consumers unless they have entered the store. In contrast, the online price needs *no* advertising; it is assumed to be observable to all consumers because it is much easier for consumers to search online. When it is in the retailer's interest to advertise the in-store price, a conventional retailer uses traditional advertising media (e.g., store flyers), but a multichannel retailer can use its website as an additional medium. For example, it can post weekly ads for the local store on the Web. More importantly, many multichannel retailers have adopted the same price policy across channels so that consumers can browse online and easily check the price for every product carried in the physical store. (Under the same price policy, the online list price is the in-store price and the delivered price is the list price plus a shipping fee.)

To focus on the strategic effect of price advertising and to rule out the impact of differences in advertising technologies on the adoption of multichannel retailing, I assume that both conventional advertising and online advertising are effective enough to reach all customers at minimal costs.[9] I relax the assumption in §5 where the complementarity of advertising online and offline is considered. I also assume that online advertising on one's own website is less costly than conventional advertising. This very plausible assumption is not crucial to the results; it simply implies that the online channel will be used as a medium, if price advertising is adopted.

In stage 3, the retailers simultaneously determine the price(s) given the channel and advertising decisions. A conventional retailer chooses an in-store price P, whereas a multichannel retailer both an in-store price P and a uniform delivered price P_d (shipping fee included). The assumption of uniform delivered pricing is realistic because online retailers generally do not price discriminate based on the consumer's geographic location. For example, within broad geographical ranges—such as the continental United States—the price of shipping is not dependent upon the location of the shopper's home. The assumption that a multichannel retailer sets the online and offline prices separately does not conflict with the common practice of relating the two prices to each other. Consider, for example, the case where the retailer sets only one price across the channels. This is

equivalent to this modeling because the retailer also needs to set a shipping fee.

The advertising decision goes before the price decision because I assume that a multichannel retailer advertises by adopting the same price policy. I make this assumption for both empirical and theoretical reasons. Increasing numbers of leading multichannel retailers strive to provide cross-channel consistency by offering the same products and the same prices on the two channels (e.g., Best Buy, Staples, and Sears, among others); naturally, store websites become a medium for price advertising. Whereas the Web can be simply used to post an electronic version of weekly ads by local stores, I want to make a theoretical distinction between price advertising online and in traditional media. Unlike traditional media where only a very small number of products can be advertised, a transactional website has the superior ability to provide price information for *all* the products the retailer carries (as discussed in §2). To capture this important and distinctive aspect of price advertising in the online channel, price advertising by multichannel retailers is assumed to be linked to the same price policy, and clearly this store policy is a higher-level decision and harder to change than the price decisions. I discuss how the results rely on the order of the decisions in the latter part of the section.

To investigate the impact of cost difference on the channel and advertising decisions, I assume that the retailers carry the same product, but the retailer at left is endowed with a marginal cost $c \geq 0$ and the one at right a marginal cost normalized to zero. This assumption is plausible. Large companies such as Wal-Mart enjoy greater economy of scale and get better deals from suppliers, and their logistics are more efficient than most small companies. The difference in marginal costs may be because of differences in quality or services, but I want to abstract from vertical differentiation for simplicity. In addition, for theoretical reasons, I want to draw a contrast between the implications of cost difference considered in this paper and the implications of vertical positioning considered by Zhang and Moorthy (2007).

Given the retailers' decisions, each consumer self-selects where to buy based on the total cost of each shopping option (or the *expected* total cost, if she is uninformed). If she buys in the conventional channel, her total cost will be the in-store price P (or the expected price P_E) plus the travel cost t multiplied by x, where x is her distance to the store. I can interpret the cost xt as the inconvenience of conventional shopping. Although every consumer has the same unit travel cost, the inconvenience differs among consumers because of their different locations. If the consumer makes the purchase in the online channel, her total cost will be the delivered price P_d

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[9] Because my concern is with whether or not (rather than how much) a retailer should advertise, I assume a full reach of advertising at zero cost for simplicity (see Lal and Matutes 1994, Simester 1995). In practice, the costs of advertising must affect the decisions on whether, on which medium, and how much to advertise. I thank an anonymous reviewer for this point.

plus a disutility $\mu \geq 0$ (as in Balasubramanian 1998). Online disutility arises as a result of the separation of the customer from the seller and the product. For example, consumers cannot "touch and feel" an item online, and neither can they have immediate gratification because delivery takes time (Alba et al. 1997, Brynjolfsson and Smith 2000). Online disutility may also arise for some consumers who derive utility from the act of shopping offline itself. However, the results do not change even if μ is negative as long as $|\mu|$ is not too large, as seen in the Technical Appendix, available at http://mktsci.pubs.informs.org.

Note that in this model, although the retailers are differentiated offline because of their separate locations, they are not differentiated online. This extreme assumption is made to capture the important fact that differentiation online may be more difficult to establish. Although there are factors that become more significant online (e.g., trust and awareness), the Internet seems to provide fewer dimensions for differentiation. For instance, by nature there is less personalized human contact on the Internet. Prepurchase trial and after-sales services (including returns) are impossible or difficult to offer. In addition, unlike store ambiance in the real world, store design on the Web cannot convey a status differentiation because any other retailer could easily copy it. Having said that, I discuss how the results will change if the two retailers are differentiated in the online channel in the latter part of the next section.

Also note that the identification of the inconvenience of conventional shopping and disutility online for consumers (i.e., xt and μ, respectively) as well as the additional e-fulfillment costs online for retailers (i.e., the delivery cost d) have important implications in the model. Online consumers need to make a trade-off between the price (net of the online disutility) and shopping convenience, and the retailers have to balance the sales from the online and offline channels, taking into account the relative margins.

Given the structure of the game, the appropriate equilibrium concept is the subgame perfect equilibrium (SPE). In such an equilibrium, when retailers make the channel decisions, they anticipate the equilibrium advertising strategies to follow. Moreover, when they make the advertising decisions, they anticipate the equilibrium prices to follow.[10] In the next section, using backward induction, I first derive the equilibrium of the advertising subgames and then go back to the channel decisions to derive the SPE(s). Proofs are available in Technical

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[10] The equilibrium analysis of the subgames is therefore equally applicable to situations where an incumbent retailer, conventional or multichannel, faces the entry of a competitor that is either conventional or multichannel.

Table 1   Summary of the Notations

C	Conventional channel ("bricks-and-mortar")
M	Multichannel ("bricks-and-clicks")
A	Advertising the in-store price
NA	Not advertising the in-store price
P	Offline in-store price of the high-cost retailer
p	Offline in-store price of the low-cost retailer
P_d	Uniform delivered price of the high-cost retailer
p_d	Uniform delivered price of the low-cost retailer
Π	Total profit of the high-cost retailer
π	Total profit of the low-cost retailer
v	Consumer willingness to pay for the product
t	Consumer unit travel cost in conventional retailing
θ	Proportion of the uninformed consumers
c	Marginal cost of the product for the high-cost retailer
μ	Consumer online disutility
d	Marginal delivery cost

Appendices 1, 2, 3, and 4, respectively, available at http://mktsci.pubs.informs.org. Table 1 summarizes the notations.

4.   Analysis

4.1.   A Benchmark Monopoly Model

I start the analysis with a simple case where there is only one retailer in the market. Assume that the retailer's physical store is located at the left end of the unit line. To contrast with the duopoly model, the consumer unit travel cost is assumed to be large enough (i.e., $t > (v-c)/2$) so that the market is only *partially* covered by the retailer's conventional in-store services; consumers who are located too far from the local store do not make a purchase because of their high travel costs.

The online channel is associated with retailer delivery cost and consumer online disutility. These disadvantages can be so severe as to rule out multichannel retailing as an equilibrium strategy. However, when the disadvantages are not too large (i.e., $\mu + d < \min(2t, v)$), adopting a multichannel strategy can benefit the retailer. First, equipped with one more channel, a multichannel retailer can segment and better serve its consumers who have different needs for shopping convenience. Consumers close to the local store buy in-store and consumers located at distance order a delivery, dividing themselves according to locations. Second, the addition of an online channel can help to greatly expand the market. In this model, because the retailer's delivery cost is constant and because the uniform delivered price subsidizes consumers' travel costs, the entire market is covered.

Market expansion can also be achieved through price advertising (Kaul and Wittink 1995). In fact, I can show that with price advertising, a conventional retailer can attract more consumers to visit the store to make purchases (even though the market may still not

be fully covered). However, a multichannel retailer in this model advertises for a different purpose. After all, the addition of the delivery services has already helped cover the entire market. The offline in-store price is lowered when it is advertised, but the online delivered price remains the same. As a result, the consumers who were indifferent to buying either online or offline will choose to buy offline. Therefore, advertising the in-store price draws consumers back to the physical store. This ability of price advertising to shift the sales from online to offline is beneficial to the retailer because the online channel yields a lower margin than the conventional offline channel because of the additional delivery cost and consumer online disutility, and yet it also cannibalizes the sales from the offline channel.

Therefore, in equilibrium, the retailer adopts a multichannel retailing strategy and advertises the offline in-store price on the online channel. The information provision function of the online channel helps coordinate the channels and thus is a positive determinant of the adoption of a multichannel retailing strategy. Not surprisingly, the more the uninformed consumers, and the lower the marginal cost, the greater the incentive for the conventional retailer to adopt a multichannel strategy and to advertise the offline price in the online channel. The above findings are summarized in the following proposition. (Proofs are simple and available from the author upon request.)

PROPOSITION 1. *In a monopoly market, if the retailer delivery cost and consumer online disutility are not too large, there is a unique equilibrium in which the retailer adopts a multichannel strategy and advertises the in-store price. The greater the proportion of the uninformed consumers and the lower the marginal cost, the greater the incentive the retailer has to adopt the equilibrium strategies.*

4.2. Advertising in Conventional Retailing (C, C)

I now turn to the duopoly model. I focus on a competitive market in which the entire market is always covered. Effectively, I assume that the willingness to pay v is large enough relative to the unit travel cost t. Otherwise, consumers in the middle of the market will choose *not* to shop at all and the model will degenerate to a monopoly one.

Not surprisingly, when both retailers advertise, price competition is intensified because consumers will compare the prices at the two stores. I can show that the prices are highest when neither retailer advertises and lowest when both retailers advertise. The price competition intensification effect of advertising is so strong that neither retailer would advertise unilaterally. Therefore, there is an equilibrium in which neither retailer advertises.

Although price advertising cannot help expand the total size of the market, it can bring about some

competitive advantage for retailers. Suppose that the marginal cost difference c between the two retailers equals zero and that only one retailer advertises. The advertising retailer is then able to credibly communicate and commit to a low price to attract consumers and, as a result, obtain a larger market share and greater profit than the nonadvertising rival. The greater the proportion of uninformed consumers, the greater the advantage the advertising retailer enjoys and, in turn, the severer the disadvantage the nonadvertiser suffers. To avoid such disadvantages, one more equilibrium arises in which both retailers advertise if the proportion of uninformed consumers is sufficiently large (i.e., if $\theta > 3/4$). In this equilibrium, both retailers are worse off, but neither one would give up advertising given the rival is doing so. It is a "prisoner's dilemma."

PROPOSITION 2. *In a market with two conventional retailers competing against each other, there is an equilibrium in which neither retailer advertises its in-store price. If the proportion of uninformed consumers is sufficiently large (i.e., if $\theta > 3/4$), there is one more equilibrium in which both retailers advertise their prices.*

4.3. Advertising in Multichannel Channel Retailing (C, M), (M, C), and (M, M)

As before, I focus on cases where the sum of delivery cost and online disutility is not very large (i.e., if $t > \max((5(\mu + d) + 2c)/4, c - \mu - d)$) so that the online channel makes positive sales in equilibrium. In such cases, consumers close to the local stores buy in-store, whereas consumers who have higher travel costs order an online delivery.

First, I look at the cases where only one retailer is multichannel, (C, M) or (M, C). In these cases, the competition interface is between the multichannel retailer's delivery services and the conventional retailer's in-store services. The two retailers' incentives to advertise differ now that they have different channel arrangements. Because the conventional retailer's advertising will directly affect the competition interface and thus the market shares, the conventional retailer can use an advertised and thus lowered price to defend. The larger the proportion of uninformed consumers θ, the greater the effect of the defense. The price competition intensification effect of advertising also increases with θ, but the gain from defensive advertising outweighs the loss from intensified price competition if $\theta > 3/4$. Therefore, the conventional retailer advertises in equilibrium if and only if the proportion of the uninformed consumers is sufficiently large.

The multichannel retailer may also advertise, but for a different reason. Because the market boundary is set by its delivery services and the rival's in-store services, advertising the in-store price will mainly

affect the interaction between its own online and offline channels rather than the competition interface. The in-store price will decrease, and as a result, the consumers who were indifferent to whether to buy online or offline will choose to buy offline. Therefore, the insight I have obtained in the monopoly model is robust in duopoly: advertising the in-store price draws consumers back to the physical store and shifts the sales from online to offline.

From the multichannel retailer's point of view, whether the shift of sales is optimal depends on the relative margins in the two channels. In this model, margins depend on the relative information efficiency across the online and offline channels (recall that online prices are always observable but offline prices are not) as well as the associated benefits and costs. Specifically, the larger the proportion of the uninformed consumers θ, the higher the margin offline relative to online. The smaller the inconvenience of conventional shopping t, or the larger the delivery cost d and online disutility μ, the higher margin the offline channel yields. I can show that the multichannel retailer advertises if $\theta > 3/4$ and if t is small but d and μ are large. In this case, because the online channel cannibalizes the offline sales but yields a relatively slim margin, the multichannel retailer is better off shifting the sales from online to offline through price advertising. If the margin online is sufficiently large, however, channel cannibalization is beneficial and thus price advertising becomes suboptimal. Because a low-cost retailer always suffers more from intensified price competition, a multichannel retailer is less likely to price advertise if it is low-cost than if it is high-cost.

In sum, in a market where a multichannel retailer and a conventional retailer compete against each other, both retailers may price advertise, but for different reasons. As advertising intensifies price competition, the conventional retailer adopts it as a defensive strategy, but only when the proportion of uninformed consumers is sufficiently large. Advertising is not always optimal for the multichannel retailer either. It is adopted only when the online channel severely cannibalizes offline sales and yields a slim margin. In such a case, price advertising helps coordinate the channels by shifting the sales from online to the more profitable offline channel.

PROPOSITION 3. *When a multichannel retailer and a conventional retailer compete against each other, neither retailer advertising, the conventional retailer alone advertising, and both retailers advertising are all possible equilibria. Specifically,*

- *If $\theta < 3/4$, neither retailer price advertises in equilibrium.*
- *If $\theta > 3/4$, the conventional retailer price advertises in equilibrium, whether it is high- or low-cost. In the case*

of (M, C), the high-cost multichannel retailer advertises if $t < ((8 + 13\theta)(\mu + d) + 4(2 - \theta)c)/(16 - 8\theta)$. In the case of (C, M), the low-cost multichannel retailer advertises if $t < ((8 + 13\theta)(\mu + d) - 4(2 - \theta)c)/(16 - 8\theta)$.

The insights obtained in the asymmetric multichannel cases carry over to the case in which both retailers adopt the multichannel strategy. In (M, M), because the delivered products are identical, price competition online is extremely fierce. The online margin for the low-cost retailer is positive but very thin and for the high-cost retailer is zero. Consequently, both retailers are better off advertising to shift the sales from online to offline.

PROPOSITION 4. *When two multichannel retailers compete against each other, there is a unique equilibrium in which both retailers advertise.*

4.4. Channel Decisions
As in the previous subsections, I focus on the cases where the online channel makes positive sales. A simple—if tedious—computation derives the SPE as follows:

PROPOSITION 5. *In the competitive duopoly market, there is no SPE in which both retailers adopt the multichannel retailing strategy.*

If $c = 0$, multichannel is not an equilibrium strategy. $(C/NA, C/NA)$ is always an SPE. $(C/A, C/A)$ is also an SPE if $\theta > 3/4$.

If $c > 0$, multichannel can be an equilibrium strategy, but only for the low-cost retailer. Specifically, $(C/NA, C/NA)$, $(C/A, C/A)$, and $(C/NA, M/NA)$ are possible SPEs but under different conditions:[11]

—*$(C/NA, C/NA)$ is an SPE if (a) $\theta > 3/4$, or (b) $\theta < 3/4$ and $t > \alpha(\mu + d)$.*

—*$(C/A, C/A)$ is an SPE if $\theta > 3/4$ and if $t > \max(\beta(\mu + d), ((8 + 13\theta)(\mu + d) - 4(2 - \theta)c))/(16 - 8\theta)$ or $((8 + 13\theta)(\mu + d) - 4(2 - \theta)c)/(16 - 8\theta) > t > c - 4(\mu + d) + \sqrt{90(\mu + d)^2 - 48(\mu + d) + 8}/2.$*

—*$(C/NA, M/NA)$ is an SPE if $\theta < 3/4$ and $\alpha(\mu + d) > t > \gamma(\mu + d)$, where α, β, γ are defined in Technical Appendix 4 (see http://mktsci.pubs.informs.org).*

There is no SPE in which multichannel retailing is adopted by both retailers. Employment of online delivery services is a very aggressive strategy. It enables the retailer to compete effectively over a larger geographic area, so even customers close to the rival store are susceptible. However, in the online space,

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[11] Note that in this model there are two equilibria in the (C, C) subgame if $\theta > 3/4$. In certain parameter space, $(C/A, M/NA)$ may also arise in an SPE. However, the existence of this SPE hinges on the condition that the low-cost multichannel retailer expects (A, A) to be the equilibrium strategy in (C, C). It will deviate to shed its online channel if it expects the (NA, NA) equilibrium instead. I therefore focus on the $(C/NA, M/NA)$ SPE.

there is no retailer differentiation based on location; the rivalry therefore gets transferred to the price dimension. The intensified price competition on the online channel not only hurts the offline sales but also transmits to the offline world and lowers profits there. When both retailers are multichannel, differentiation completely vanishes for the delivered products. Head-on competition and channel cannibalization are so severe that either retailer is better off shedding the online channel.

The adoption of multichannel retailing, however, can bring about some competitive advantage over a conventional retailer because the multichannel retailer has greater market reach and is able to cater to consumers' different needs for shopping convenience. As shown in Proposition 5, asymmetric adoption of a multichannel strategy can arise in equilibrium only when t, the consumer unit travel cost in conventional retailing, is at an intermediate level. When t is very small, consumers will not see the value of the online delivery services. When t is very large, however, the delivery services will become too attractive and the problem of channel cannibalization will be too severe.

Proposition 5 also implies that in the multichannel equilibrium, the two retailers' cost difference c needs to be large and the proportion of uninformed consumers θ, small (see Figure 2). Multichannel retailing is more appealing to the low-cost retailer because it can make better use of the online channel's ability to expand its market, and such a benefit stands out only when its cost advantage is sufficiently large. On the other hand, because online prices are observable to all consumers, the retailers' ability to exploit the uninformed consumes is mitigated in the presence of an online channel. A retailer would rather take full advantage of these consumers' ignorance and not open an online store if the proportion of the uninformed consumers is sufficiently large.

The asymmetric adoption of multichannel retailing also arises in equilibrium in the model of Zhang and Moorthy (2007) but for a different reason. In their

Figure 2 **Illustrating the Parameter Space in Which the Multichannel Equilibrium May Exist**

model, retailers have the same marginal cost and consumers observe all the prices. When consumer heterogeneity, in terms of a willingness to pay for shopping convenience, is sufficiently large, the authors show that the delivery services only cater to the high-travel-cost segment but not to the low-travel-cost segment. As a result, the adverse effect of the addition of an online channel is mitigated in their model; it is not a commitment to market expansion but a commitment to market segmentation and differentiation.

The incentives to advertise vary among competing retailers. Price advertising intensifies price competition. Therefore, it is only used as a defensive strategy for a conventional retailer and adopted only when the proportion of uninformed consumers is large (i.e., if $\theta > 3/4$). In contrast, a multichannel retailer advertises only when the online channel yields a relatively slim margin, so that a shift of sales from online to offline is profitable. However, when this is the case, the retailer is better off shedding the online channel. Therefore, in the current model, there is no SPE in which a multichannel retailer advertises.

4.5. Discussion
To summarize these results, if delivery costs and consumer online disutility are very large, the Web-based delivery services are not a viable option for retailers to offer. If these disadvantages are not that serious, multichannel retailing can be optimal because it enables the retailer to expand the market (share) and better serve consumers who have different needs for shopping convenience. Nevertheless, the addition of delivery services can have negative effects. It inevitably results in the migration of sales from offline to online, and channel cannibalization arises. It also results in fierce price competition because the product differentiation based on location vanishes online. However, these negative effects are not that strong for retailers that face a lower level of competition and have lower (marginal) costs. I find that multichannel retailing and price advertising are the unique equilibrium strategy for a monopoly retailer, and that low-cost retailers are more likely to add an online channel. For these retailers, the positive market-expansion effect outweighs the negative channel-cannibalization and price-competition-intensification effects.

Because of their differences in marginal cost and channel structure, retailers have different incentives to advertise the in-store prices in the era of multichannel retailing. Price advertising has a negative effect. It aggravates price competition because it increases consumer price sensitivity. In this model, when competition is absent, advertising can expand the (total) size of the market by attracting new customers. In this case, the lower the marginal cost, the greater the incentive the retailer has to advertise. However,
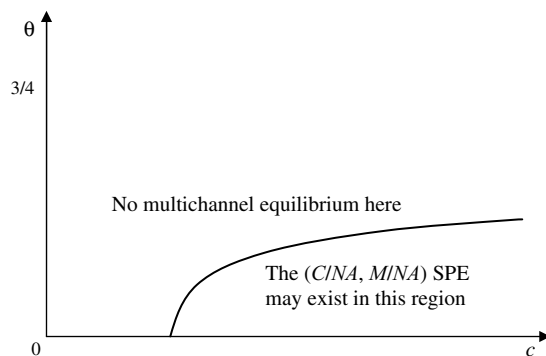
when competition is strong and the total market size is fixed, a low-cost retailer has less incentive to advertise because it suffers more from the effect of advertising. In a market where a conventional retailer and a multichannel retailer compete against each other, the former advertises to defend its market share. In contrast, a multichannel retailer advertises to shift sales from online to offline to alleviate the adverse effect of channel cannibalization when the margin online is relatively low. Therefore, in this model, the major reason for the multichannel retailer to advertise using the online channel is not because it is cheaper but because it helps coordinate the channels. In fact, these results show that under some conditions, a retailer advertises when it is conventional, but it does not when it becomes multichannel, implying that advertising decisions should be made taking into account the costs as well as competitors' strategic reactions.

To facilitate developing the insights above, I use much simplified models. The market size is fixed in the duopoly model, although I acknowledge that in some markets the online channel is extremely powerful in attracting "new" customers. I also assume that the retailers sell the same product, an assumption that is quite restrictive because retailers are generally differentiated in terms of products, services, etc. In a model that captures these facts, the negative effects of price-competition-intensification and channel-cannibalization should be mitigated, and the positive market-expansion effect can stand out. Hence, both retailers being multichannel may arise in equilibrium. However, as long as differentiation online is not particularly large (for reasons that were discussed previously and elaborated in §6), the emergence of this new SPE does not alter the insights into the strategic pros and cons associated with multichannel strategy and the channel coordination effect of price advertising in a multichannel context.

I have assumed that the advertising decision is made before the price decision for both empirical and theoretical reasons. However, in conventional retailing, retailers are likely to make the two decisions simultaneously before starting an advertising campaign, and there are situations in which the order of the two decisions is reversed. Does the change in the order alter the results qualitatively?[12] There are good reasons to believe that it does not. As discussed above, advertising increases consumer price sensitivity and thus decreases the offline price. The online delivered price may decrease accordingly as well, but it is of a second order effect. In other words, because the offline price is unobservable to some consumers unless advertised but the online price is always observable, advertising reduces the former to

a greater extent than the latter, and as a result some online consumers will migrate to the offline channel. If the order of the decisions is changed, this effect of advertising may become weaker, but it does not disappear. Additionally, the finding that the addition of online delivery services results in intensified price competition and severe channel cannibalization does not hinge on the order of the decisions. Instead, it relies on the assumption that the retailers are differentiated offline because of their separate locations and they are not differentiated in this way online. Therefore, the SPE I have identified should also be robust. In short, changing the order of the advertising and price decisions is unlikely to change the propositions.

The observation that the multichannel retailer does not advertise in SPE may seem empirically incorrect because most multichannel retailers advertise their in-store prices on their websites. This needs to be understood in the context of this model. I assume that the two retailers sell identical products. If product differentiation was allowed in the model, online margins could be high enough so that adding an online channel is an equilibrium strategy, but not high enough so that advertising is also an equilibrium strategy. I also assume that advertising the offline in-store price in traditional media and advertising on the website are both effective enough to reach all customers. In reality, the two types of advertising differ in targets and efficacy and thus complement each other. Because of cost considerations, retailers may choose partial coverage instead of full coverage. In one of the extensions in the following section, I show that if complementarity of advertising online and offline is allowed, advertising by the multichannel retailer can arise in SPE.

5. Extensions

5.1. Oligopoly Market

What if there are more than two retailers in the market?[13] In this section, I show that retailers' incentives to adopt the multichannel and price advertising strategies can be strengthened in an oligopoly.

Consider a market consisting of three retailers, A, B, and C (or more). They sell the same product but at different marginal costs. A unit mass of consumers is uniformly distributed on a circle, and the three retailers are located on the circle at the same distance from each other (as in Balasubramanian 1998). Other assumptions are the same as the previous duopoly model.

Suppose that retailers A and B are multichannel. Then according to the previous analysis, price competition online is fierce and their margins online are thin. The acute price competition online not only

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[12] I thank the review team for suggesting this discussion.

[13] I thank an anonymous area editor for suggesting this exploration.

adversely affects A's and B's bricks-and-mortar business but also C's, even if C is bricks-and-mortar only. Now suppose that C is multichannel as well. Shedding its online channel will result in lower profit if C's marginal cost is the lowest. On the other hand, if its cost is the same as A's and B's (so they are symmetric), shedding the online channel will not affect profitability but will decrease its market share. If its cost is the highest, it is indifferent to shedding the online channel. Therefore, there is an equilibrium in which retailers A, B, and C are all multichannel. More generally, when the number of retailers is no less than three, there are possibly multiple equilibria in which at least two retailers are multichannel, and there is an SPE in which all the retailers adopt the multichannel strategy. In these equilibria, no retailer is better off shunning the multichannel strategy, although the adoption may not improve profitability either. Multichannel is a strategy that retailers have to follow because they want to maintain as large as possible market shares (which is a very plausible assumption, particularly in a short term). I can further show that advertising is the equilibrium strategy for the multichannel retailers because their margins online are so thin that a shift of sales from online to offline is profitable. Proposition 6 follows. (A formal proof is available from the author upon request.)

PROPOSITION 6. *In the oligopoly market, there is an SPE in which all the retailers adopt the multichannel strategy and advertise their in-store prices online.*

5.2. Complementary Advertising Strategies
I have discussed some of the differences between advertising online and in traditional media. In this section, I assume that advertising on different media has different targets and efficacy. To simplify exposition, I focus on a duopoly market and assume that advertising either offline or online independently reaches a proportion η of uninformed consumers, but advertising both offline and online reaches all uninformed consumers. Furthermore, I assume that a conventional retailer can only advertise offline, but a multichannel retailer can choose to advertise either offline or online to achieve partial coverage of the uninformed consumers or to advertise both online and offline for full coverage. For simplicity, I assume that the reaches of the two retailers' advertising are independent. I maintain the assumption that advertising costs are minimal but less costly online than offline. Other assumptions are also maintained.

Analysis shows that there exists an SPE in which the low-cost retailer adopts a multichannel strategy and the high-cost retailer a conventional one. Furthermore, if the high-cost conventional retailer does not advertise, the multichannel retailer does not

either. However, if the conventional retailer advertises (in conventional media) and if the online channel is not very profitable, the multichannel retailer may respond with limited advertising. Partial coverage of advertising is preferred so as to avoid intensifying price competition too severely. Therefore, the multichannel retailer advertises in equilibrium. Because price advertising on the store website is virtually free (e.g., consider a retailer who adopts the same price policy so the in-store price is the list price online) and it effectively targets the online consumers, the Web will be used as the medium. Consistent with the previous results, because advertising online improves channel coordination, it strengthens retailers' incentive to adopt a multichannel strategy. (See the proof in Technical Appendix 5, available at http://mktsci.pubs.informs.org.)

PROPOSITION 7. *In the duopoly market where advertising online and offline complement each other, there is an SPE in which the high-cost retailer adopts the conventional retailing strategy, and the low-cost retailer a multichannel retailing strategy, and both retailers price advertise (but only for partial coverage).*

This model can be extended to the cases in which different advertising media (i.e., store flyers, websites, television, newspapers, etc.) target different groups of consumers and have different levels of coverage. In such cases, a multichannel retailer in competition may utilize multiple media to reach some (but not all) of its target consumers in equilibrium.

6. Conclusions and Managerial Implications
In this paper, I provide theoretical analysis of the conditions under which the adoption of multichannel strategy and price advertising is optimal. I find that multichannel retailing and price advertising can have different effects, depending on the nature of the product, the competitiveness of the market, the retailer's costs, and competitors' strategies. Specifically, I find that under different conditions, no adoption, asymmetric adoption, and symmetric adoption of multichannel strategy are all possible equilibria for competing retailers. I also find that multichannel retailers advertise their in-store prices online so as to draw consumers back to the physical stores when margins online are relatively low. The information provision function of the online channel is a positive determinant of the adoption of multichannel strategy because it improves channel coordination.

In contrast to common wisdom, I find that multichannel retailing is not necessarily optimal for all retailers. Delivery services are associated with consumer online disutility and e-fulfillment costs. For

some products, these disadvantages by themselves may be so severe as to rule out the Web-based delivery services as equilibrium strategy. For instance, eyeglass retailers and convenience stores rarely adopt a multichannel strategy because their customers need to inspect the product physically or get the product immediately. Dollar stores rarely adopt a multichannel strategy either because the shipping cost is too large relative to the value of the product. Although it is true that more consumers are starting to use and trust online services and that broadband has enabled online consumers to get a much better "feel" for the product than ever before, I have reason to believe that these disadvantages will not disappear. Additionally, the costs of e-fulfillment are seemingly on the rise; they jumped by more than 50% per order in 2003, according to the State of Retailing Online 7.0 (Shop.org 2004), and at present, the U.S. Postal Service, FedEx, and UPS are seeking to boost rates.

One main contribution of the research is the identification of some "strategic pros and cons" of multichannel strategy that arise from the strategic interaction between competitors. In particular, it reveals three key challenges faced by contemporary multichannel retailers—namely, acute price competition online (and thus slim margins there), severe channel cannibalization, and a competitive market whose size is hard to increase. The Internet is notorious for acute price competition. Given the price transparency, facilitated search mechanisms, and limited dimensions for differentiation online, the competitive pressures have increased over the past 10 years (Mulpuru et al. 2006). A history of a constant stream of promotions such as percent discounts, dollars off, and free shipping has ground down profit margins online and left the Web with the dubious reputation of being a "bargain basement." Most consumers expect to find lower prices online than in other channels, and they do not want to pay for shipping. The fierce competition online not only results in slim margins online but also transmits to the offline world and hurts the profit there through channel cannibalization. Cannibalization itself is not necessarily bad; many marketing strategies entail some form of cannibalization. For example, calculated product line development can enhance the firm's position in a market and improve profitability. However, it is problematic for many multichannel retailers because the online delivery services yield a very slim margin relative to the in-store services[14] and because the online customers no longer represent incremental business to firms, according to

a teleconference held by Forrester Research in 2008 (Favier 2008).

These findings suggest that, unlike 15 years ago when the Internet could help a local retailer to quickly get orders nationwide, capitalizing on multichannel retailing to improve overall profitability has become an increasingly demanding task. When the total market size is difficult to expand, high-cost retailers may not see the value of adding an online channel, whereas low-cost retailers may benefit from it because they gain more from an increased market share. A retailer should be particularly cautious in adopting a multichannel strategy when its major rival is already multichannel because the fierce price competition online and severe channel cannibalization can ruin its bricks-and-mortar business.

It is an empirical question whether multichannel retailing in practice is a more profitable model than bricks-and-mortar retailing. Yet based on this analysis, it seems that in markets where differentiation is hard to sustain, retailers are forced to operate an online channel because unless they achieve the same market share online as they have offline, their market share will simply decline when more business migrates online. This rationale might explain why, in the consumer electronics market (and perhaps in other oligopoly markets as well), top retailers such as Best Buy, Circuit City, and Radio Shack sell the same (or similar) products but all are multichannel. In these cases, multichannel might not be a profitable strategy, but it is a strategy that has to be followed.

This analysis implies that differentiation is vital for successful (or profitable) multichannel strategy. Apparel retailers such as Esprit and Gap are multichannel because they do not compete on the same products; they sell private labels. The disadvantages of multichannel retailing are not that severe. By contrast, retailers such as Ross and T.J. Maxx choose not to open an online store because they carry the same (or similar) brand name labels. I therefore predict that private labels should be more prevalent online than offline.

This analysis also implies that retailers should reevaluate the role and goals of the Web in their overall businesses, given the increased competition pressure there. The finding that a multichannel retailer can benefit from drawing consumers back to the physical stores highlights the risk of simply boosting online sales without considering the adverse effect on offline business. The shifting role of the Web is reflected by Steve Riggio, chief executive of Barnes & Noble: "Instead of seeing the Internet as a cannibal... an Internet connection drives customer to the store" (*RetailWire* 2004). Indeed, numerous studies have shown that the Internet's role as a consumer product and price information utility is much larger

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[14] If margins online are high enough, multichannel retailers should enjoy and encourage channel cannibalization, but the fact that they are worried about it and trying to draw consumers back to the store suggests the opposite.

than its role as a direct selling medium (Grav 2008, Anfuso 2004). Contributing to the academic literature, this analysis sheds light on the rationale and retailers' motivation for such initiatives.

I show that the price advertising online can help shift the sales from online to offline, a different effect in the context of multichannel retailing when compared to conventional bricks-and-mortar single channel retailing. Although price advertising online is likely to be cheaper than in traditional media, I believe that the major reason for its widespread use is that multichannel retailers would rather sell products through their bricks-and-mortar store network and that online advertising effectively targets the online customers. Under the same price policy, price advertising online is even more powerful in shifting sales because it advertises the prices for all the products in the store. In comparison, traditional media can only advertise a small subset, and so consumers will be less likely to go back to the physical store because they can rationally expect high prices for the unadvertised items there (Simester 1995, Lal and Matutes 1994).

"Order online but pick it up in-store" is another strategy to draw consumers back to physical stores. It has become the most popular cross-channel tactic in the United States. As online orders are picked and packed in a store, consumers can use the Web to quickly conduct extensive research and to quickly find and pay for the items but forgo the high shipping costs and delays. It has the added benefit of bringing customers to physical stores where they are likely to make additional purchases.

Although this paper focuses on retailers' decisions to add an online store, retailers in practice may also consider whether to open more bricks-and-mortar stores.[15] Building such stores can also expand the market and deter possible competition from the Internet (Guo and Liu 2006). In the Hotelling setting I have used, the low-cost retailer is expected to have greater incentives than the high-cost retailer to open a new physical store in the "middle" of the market. If the retailers can change their store locations on the Hotelling line, the low-cost retailer is more likely to position itself in the middle of the market (Tyagi 2000, 2001). If this is true, then in both cases, the retailers are less motivated to add an online channel because the market expansion effect is weakened. However, there are fundamental differences between adding an online store and adding a physical store. First, online and offline retailing are associated with different pricing and delivery models; a bricks-and-mortar store

can only serve a local market, whereas online delivery services can virtually serve consumers anywhere, without geographic limit. Second, unlike a physical store whose price advertising only targets the local customers, the Internet is very powerful in providing information, and the reach of online advertising is boundless. Therefore, an online store does not serve the same purpose as a physical store. With its impact not limited to specific local markets, the decision to expand online generally requires more and higher-level strategic considerations.

Some caveats to this analysis must be mentioned in closing. First, multichannel retailing may be adopted for other reasons that are not considered in this paper. For instance, retailers may have longer-term strategic considerations other than one-shot profit maximization as the model has assumed. The online channel may hold greater assortments at lower costs. The transaction track records online can help better understand consumer behavior. Moreover, as suggested by Liu et al. (2006), retailers may want to expand online to deter the potential entry of pure-play e-tailers (or perhaps manufacturers' direct channels as well). These considerations may further motivate retailers to expand to the online channel. Second, the present research focuses on the price information provision of the online channel, whereas in practice, multichannel retailers use the Internet to provide product and service information as well as price information. As different types of information may have different effects on consumer perception and behavior (Bakos 1997, Lynch and Ariely 2000), a more complete investigation holds significant promise and offers potential for exciting research. Finally, empirical research in this area is conspicuous by its absence. There is no systematic investigation on the impact of multichannel retailing on retailers' performances. Such necessary research should prove of great interest when it eventually appears.

Acknowledgments

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[15] I thank an anonymous reviewer and Eric Bradlow for suggesting this point.

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