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Decision Support

Timing of service investments for retailers under competition and demand uncertainty

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ABSTRACT

We study how retailers can time their service investments when demand for a product is uncertain and consumers care both about price and service when choosing which retailer to buy from. By “service” we mean activities a retailer can invest in and which can drive traffic into the store. We consider offering extended operating hours as an example of such service and examine the timing of service investments for two competing retailers. Specifically, we analyze two retailers who compete on price and service level, and characterize both the prices and the service levels, as well as the timing of their service investment decisions. Our model also considers two effects of retailer service—the effect on total demand for the product and the effect on a retailer’s market share. We show that investing in service before demand realization, although counterintuitive, can be beneficial for competing retailers. On the other hand, a large mismatch between actual and expected demand and a low probability of high demand justifies the postponement of service investments after observing demand. We also show that the incentive to invest in service before demand realization becomes more pronounced when service investments can increase the overall demand for the product in addition to protecting market share. Our findings have important implications for retailers with regards to the timing of their service investment decisions.

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1. Introduction

The holiday season is one of the biggest opportunities for retailers to lure customers and retailers use several methods to accomplish this–among others–offering extended operating hours. An increasing number of retailers are keeping their doors open longer almost every year to entice last-minute holiday shoppers. Offering extended operating hours can have an important impact on consumers’ purchasing decisions. A retailer who stays open longer than its rival typically attracts additional demand since extended hours provide consumers with more convenience and flexibility (Inderst & Irmen, 2005). As a result, offering extended operating hours has evolved as a dimension of competition and such decision is usually made considering the local competitive environment among other factors. For example, according to Sonja Pothen, Target’s spokeswoman, the decision to extend Target’s stores holiday hours several years ago was based on guest traffic, sales volume, and local competition (Deprez, 2009). Another important decision that retailers face which affects consumers’ purchasing decisions during the holiday season is pricing. One common practice that some retailers follow (especially for seasonal products) is contingent pricing which allows them to adjust pricing decisions in response to market conditions. Thus, those retailers can set higher prices when demand is high and charge lower prices when demand is low. As a case in point, Kmart would often implement a contingent sales promotion strategy for its seasonal products (Wang & Hu, 2014).

Investing in activities to draw customers into their stores, which we will be referring to as “service”, is costly for retailers. In many cases, the return on this investment is uncertain due to uncertain market conditions and retailers would eventually need to balance the costs associated with keeping their stores open longer with potential sales increases. It is interesting that despite the uncertainty involved, some retailers make their investment decisions early on but others are more cautious and want to observe customer demand before committing to such investments. For instance, several retailers announce their extended holiday hours early in the season and stick to those hours, whereas others extend their holiday hours during the holiday season and after gauging demand.

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As a case in point, Best Buy has followed the former strategy while Macy's and Toys"R"Us have followed the latter strategy in the past few years by announcing extended holiday hours just before Christmas (Levin, 2011; Woodruff, 2011).

Uncertain market conditions justify flexible pricing strategies such as contingent pricing that several retailers follow. However, it is puzzling why some retailers would want to commit to service investments pertinent to extended operating hours as opposed to respond contingently to changes in the market conditions. It makes one wonder under what conditions ex-ante versus ex-post investments in service might emerge as an equilibrium in a competitive environment. In this paper we attempt to provide some answers by building a simple stylized model. We focus on ex-ante and ex-post service investments relative to demand realization such as offering extended operating hours and study the timing of these service investments for retailers who sell the same or similar seasonal products and compete on price and service. Specifically, we consider two typical strategies: a commitment strategy where retailers announce their extended operating hours ahead of the holiday season and make them effective during the season, and a non-commitment (or contingent) strategy where retailers offer extended hours during the holiday season, i.e., respond contingently to observed demand. Offering extended operating hours may or may not entail immediate costs. If the extended hours during the holiday season are covered with the current employees working overtime, retailers do not incur any costs until the holiday season starts and the extended hours become effective. However, if new employees that require training are hired to cover the extended hours, then retailers will incur immediate costs before the holiday season. In such a setting, we address the following research questions: (1) What are the prices and service levels that arise when retailers can time their service investment decisions? (2) How do investment cost and competition influence the retailers' price and service level decisions? (3) When is the best time for retailers to invest in service? To address these questions, we consider a stylized model with two competing retailers and analyze their respective price and service investment decisions, as well as their choice between committing to service investments upfront and investing in service after demand realization. Our model also captures two different effects that service levels can have on product demand: (1) service is a necessity to avoid losing market share to competition and (2) service could enhance the overall demand for the product.

The key insight of this paper is that retailers need to carefully consider their operating environment when timing their service investments. While a monopolist would be naturally better off making investment decisions after observing demand, our analysis reveals that competing retailers would in general benefit by committing to service investments before observing demand since commitment results in lower service levels and protects competing retailers from costly investments. It is only under conditions in which the mismatch between actual and expected demand is high and the probability of high demand is low where competing retailers may be better off postponing investment decisions after observing demand. Our analysis also shows that when service increases total demand in addition to protecting market share the incentive to commit to service becomes even more pronounced. Specifically, once the demand enhancing effect of service exceeds a certain threshold, commitment becomes the unique equilibrium.

The intuition behind our key findings is as follows. When service investments do not increase demand, service competition becomes a "race to the bottom" and under conditions of low or moderate demand uncertainty retailers prefer commitment, which is the strategy that leads to lower service levels. Only when demand uncertainty is high, i.e., the mismatch between actual and expected demand is large, retailers would prefer not to commit to take advantage of much higher information precision. Nevertheless, for this benefit to outweigh the benefit of lower service levels, retailers also should expect low demand with sufficiently high probability. When service investments increase overall demand, as the demand enhancing effect increases, retailers have an incentive to provide higher service levels which result in higher service costs. A commitment strategy could curb those costs by avoiding over-investments in service. On the other hand, a non-commitment strategy allows retailers to take advantage of much higher information precision at the cost of offering higher service levels. Once the demand enhancing effect exceeds a certain threshold, the benefit of lower service levels that commitment ensures outweighs the benefit of much higher information precision. Thus, there is no incentive for retailers to deviate to non-commitment.

Our findings help to a certain extent shed some light as to why retailers would commit to service investments in the presence of competition. Commitment results in lower service levels and protects competing retailers from costly investments. On the other hand, certain retailers such as Macy's and Toys"R"Us preferred flexible strategies such as non-commitment especially during the most recent economic downturn. This is quite consistent with our results since a low probability of high demand and a large mismatch between actual and expected demand, which resembles the characteristics of an economic recession, justify non-commitment.

The remainder of this paper is organized as follows. In Section 2 we review related literature. In Section 3 we present the model of two competing retailers. In Section 4, we analyze the model and study the timing of offering extended operating hours. In Section 5, we conclude.

2. Literature review

The main stream of literature that is relevant to our work explores price and non–price competition in retail channels. Papers in that stream consider competition in price and in another dimension often referred to as "service" or "quality". That dimension is typically desirable to consumers but costly to provide. Certain papers in inventory and operations management literatures (e.g., Bernstein & Federgruen, 2004) have considered price and service competition, where "service", unlike our setting, denotes the availability of product to satisfy demand and "service levels" represent fill rates. We do not focus on this stream of literature in this review.

In a multi-echelon setting, Winter (1993) studies a manufacturer selling through retailers competing on price and service and finds that vertical price restraints can achieve multi–echelon coordination. Perry and Porter (1990) study a monopoly manufacturer who sells his products through "monopolistically competitive" retailers, who provide service that can have a positive effect on their rivals' demands. Perry and Porter (1990) use the term "monopolistically competitive" to refer to a situation where each retailer takes the price–service market variable and the average service for all retailers as given when choosing price and service to maximize its profits. The authors show that resale price maintenance and franchise fees could correct the sub–optimal level of retail service. Iyer (1998) studies how manufacturers should coordinate retail channels when retailers compete on both price and quality of service and consumers are heterogeneous in their locations and willingness to pay. Tsay and Agrawal (2000) consider a single manufacturer who sells its product through two different competing retailers. They identify the structure of the wholesale pricing mechanisms that can coordinate the channel and show that the retailers are better off when they compete on price and service rather only on price. Our work is different from the aforementioned papers in several dimensions. First, they focus on the coordination of multi–echelon channels, whereas we study

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