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Pricing/service strategies for a dual-channel supply chain with free riding and service-cost sharing

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ABSTRACT

This paper considers a two-echelon supply chain, where a manufacturer sells products through both her own online channel and a traditional retailer. The retailer provides customers with some pre-sales services, which have positive impact on the market demand. The manufacturer's online channel free-rides the retailer's pre-sales services by sharing the retailer's sales effort cost. We investigate how free riding affects the two members' pricing/service strategies and profits when the dual channels use the differential and non-differential pricing scenarios, respectively. Additionally, our study presents the following findings. (i) Under the two pricing scenarios, the service-cost sharing contract can effectively stimulate the retailer to improve his service level while free riding occurred. (ii) If the degree of free riding is not very high, the manufacturer would share a larger proportion of service cost and the retailer would set a higher service level in the differential pricing scenario than in the non-differential pricing scenario. (iii) Under the differential pricing scenario, the service-cost sharing contract may avoid price competition between two channels. (iv) The non-differential pricing scenario is more beneficial to the retailer than the differential pricing scenario, but it is just reverse for the manufacturer and whole supply chain.

1. Introduction

With the increasing development of the Internet, E-commerce is becoming more popular in retail industry. According to one survey reported by Forrester Research (2014), about $294 billion was spent online in 2014 in America, and online shopping will continue to grow at a rate of 7 percent each year, turning about $414 billion by the year 2018. The fast-increasing E-commerce market has attracted a lot of manufacturers to devote themselves to online sales during the last two decades. For instance, besides using traditional retail channels, many manufacturers (such as, IBM (Narisetti, 1998), Hewlett-Packard (Janah, 1999), Mattel (Bannon, 2000) and Nike (Collinger, 1998) etc.) also open their own online direct channels to sell products to customers. However, such dual-channel strategy of manufacturers causes price competition between channels (Webb and Didow, 1997) and also leads to free riding the traditional channel's service effort (Wu et al., 2004), which then lowers the traditional channel's desire of improving service effort further. This type of free-riding problem often occurs in such products, whose pre-sales services can be conducted separately from the actual sale of the products (Shin, 2007; Kucuk and Maddux, 2010), including those products, such as clothes, shoes, toys and furniture, etc. (Baal and Dach, 2005; Heitz-Spahn, 2013).

Researchers and practitioners have proposed many effective mechanisms that eliminate or reduce price competition between dual channels, such as maintaining the same price for the two channels (Hann, 1999), using the online channel for information and sales support only while leaving the actual sales to the traditional channel (Cohen, 2000), separating the brands sold online from those sold through physical channels (Carlton and Chevalier, 2001; Karray, 2011), etc. However, to the best of our knowledge, there is little literature that discussed incentive mechanism issues about how to enhance the traditional channel's service effort level while free riding occurred.

As we all know, compared to the manufacturer's online channel, the traditional retail channel has obvious advantages in providing customers with service. For example, the traditional retail channel can provide consumers with the retail showrooms, attractive shelf display, the offering of trial samples, and the salesman's explanation of product features, etc. But the online channel can't. All these services are rather important factors in consumers' purchasing decisions (Carlton and Chevalier, 2001; Fiala and Westrich, 2007; Ofek et al., 2011). Therefore, they play an important role in stimulating the demand of products. If without online channel, the offer of these services may be beneficial to

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the traditional channel retailers, and of course to the manufacturers. However, if a manufacturer uses the above-mentioned dual-channel strategy, some consumers who enjoy services from the traditional channel may find a better deal from online channel and make their purchases in online channel. Once such free riding behavior of consumers happened, the service effort level of the traditional channel will decline, which then leads to the decrease of the demand of products. Therefore, free riding the traditional channel's service also hurts the manufacturer's profit and the overall supply chain performance (Antia et al., 2004; Xing and Liu, 2012). That is to say, free riding has a negative effect on dual channels' performance.

In practice, in order to encourage the traditional channel to enhance its service effort level under free riding, the dual-channel manufacturers, such as Blue moon, a leading laundry detergent manufacturer in China, and Samsung, one of the world's largest mobile phone manufacturers, etc., have provided free advice for the traditional channel's promotion, sent their own employee to the traditional channel to help selling, or offered the professional training, etc. Take Samsung as an example, in China market, Samsung not only has its own online channel, store.samsung.com/cn, but also sells products to customers through Gome, one of the largest retailers in China. This means that consumers who enjoy Gome's pre-sales service may free ride to Samsung's online store to buy. A senior vice president of Gome also said that about 10% of customers enjoy the pre-sales service of products in Gome but free ride to online channel.[1] In order to encourage Gome to enhance its service effort level, Samsung further improved the strategic cooperation relationship with Gome in 2013, and provided Gome's salespeople with the professional training, and so on.[2] This phenomenon means that the manufacturers share essentially a part of service cost with their traditional channel retailers. We call this mechanism a service-cost sharing (SCS) contract.

However, why do these phenomena emerge? Whether can a SCS contract enhance the traditional channel's service effort level and eliminate the negative impact incurred by free riding? How does free riding influence the strategies and profits of the manufacturers and their traditional channel retailers under the SCS contract? Can providing the SCS contract really bring the manufacturers more benefits? These natural questions are not answered by the literature.

The main motivation of the present paper is to cover this gap. To do so, we consider a supply chain where a manufacturer sells a single product, whose pre-sales services and actual sales are separable, through a traditional channel retailer and her own online channel. The retailer offers consumers the pre-sales services like fitting rooms, trial samples, consulting information about product features, etc. The manufacturer's online channel can free ride the traditional channel's services. Since the dual channels may set the same or different retail prices in reality, our research is performed for two scenarios with and without differential pricing at two channels, respectively. Under the two different pricing scenarios, we study whether or under what conditions a SCS contract can eliminate the negative impact incurred by free riding.

The main findings of this paper are the following. (1) Under the two differential pricing scenarios, the SCS contract can effectively stimulate the retailer to improve his service level while free riding occurred. (2) Even if under the SCS contract, free riding has always a negative effect on the retailer's profit but a positive effect on the profit of the manufacturer and the total supply chain. (3) If the degree of free riding is not very high, the retailer would set a higher service level and the manufacturer would share a larger proportion of service cost in the differential pricing scenario than in the non-differential pricing scenario. (4) The non-differential pricing scenario is more beneficial to the retailer than the differential pricing scenario, but it is just reverse for the manufacturer and whole supply chain. (5) Under the differential pricing scenario, the SCS contract may avoid price competition between two channels.

The remaining of this paper is organized as follows. Section 2 and 3 presents the literature review and model framework. In Section 4, given that the dual channels use the differential pricing scenario, we study the impact of free riding on the pricing/service strategies, demands and profits of the dual channels. Yet Section 5 discusses the corresponding issues under the situation where the dual channels set the same price. Section 6 illustrates the model with a numerical example and presents the sensitivity analysis of parameters. The conclusions are presented in Section 7.

2. Literature review

Our study is mainly related to two categories of literature. The first category is concentrated on service effort coordination between different partners. The second category focuses on free riding in dual channels. In the following, we will review briefly these two categories of literature.

In the last two decades, many researchers have paid much attention to service effort coordination. For example, Taylor (2002) discussed how a manufacturer designs the channel rebate based on the retailer's service effort level, and found that the provision of the channel rebate strengthens incentives for the service effort. Cachon (2003) surveyed the literature on service effort and supply chain coordination. He showed that hybrid supply chain contracts (e.g., sales rebate, buy-back, and revenue sharing) can achieve supply chain service effort coordination. Furthermore, Krishnan et al. (2004) investigated a supply chain where a risk-neutral manufacturer sells a single product to a risk-neutral retailer. They showed that while a buy-back alone cannot coordinate the channel, coupling buy-backs with promotional cost-sharing agreements (if effort cost is observable), offering unilateral markdown allowances ex post (if demand is observable but not verifiable), or placing additional constraints on the buy-back (if demand is observable and verifiable) does result in coordination. He et al. (2009) studied a supply chain with a stochastic demand that depends on both sales service effort and retail price. They found out that the returns policy with sales rebate and penalty contract can achieve supply chain coordination. Karray (2011) investigated the effects of horizontal joint promotions among retailers and showed that the cost-sharing strategy can improve each channel member's profit through demand expansion and higher margins in all the channels. Ma et al. (2013) investigated the issue of channel coordination for a two-stage supply chain with one retailer and one manufacturer. They assumed that demand is influenced by the retailer's sales effort and manufacturer's quality improvement efforts. They found that using the traditional two-part tariff contract alone cannot coordinate the supply chain well, and proposed an innovative contract to coordinate the supply chain. Lee (2014) examined how to set efficient inventory levels when new marketing efforts are made and product demand is auto-correlated. They showed that the required inventory is much different under a stationary demand model from under a non-stationary model, and proposed an inventory model that explicitly acknowledges uncertainty over stationary and non-stationary demand models in response to new marketing efforts. Yan and Zaric (2016) studied all possible coordinating contracts for a supply chain with retailer promotion efforts. They showed that different contract families have different levels of efficiency, flexibility, and required information for coordination. Hu and Feng (2017) studied the supply chain with revenue sharing contract and service requirement under supply and demand uncertainty. They showed that both the buyer's and supplier's optimal quantities are non-decreasing of the service requirement.

However, none of the existing literature in this stream has investigated service effort free riding phenomenon in dual-channel supply chains. Different from those researches, this study focuses on whether or how the manufacturer, having her own online channel, designs a SCS contract to stimulate the retailer to improve the service level so that the manufacturer can benefit much more from free riding the service offered by the retailer.

[1] http://news.xinhuanet.com/fortune/2014-03/24/c_119901616.htm.
[2] http://www.gome.com.hk/html/about_achievements.php.