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The impact of customer returns in a supply chain with a common retailer

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ABSTRACT

Efficient distribution of the product in a supply chain is a critical issue in supply chain management. In the paper, we study a manufacturer Stackelberg supply chain in which a retailer can sell either or both of two brands, a well-known brand and a new brand, in a market supplied by two manufacturers. The two brands are differentiated by customer satisfaction rate. The supply chain involves both vertical competition between the retailer and manufacturers, and horizontal competition between the two manufacturers. We identify the conditions under which the retailer should choose one or both of the two manufacturers, and we show that in certain circumstances, the retailer will prefer to work with both manufacturers, even though one brand of product may have no sales. We find that whether a money-back guarantee (MBG) returns policy should be offered for the supply chain depends only on whether or not the retailer can recover the value of the returned product efficiently, even when the retailer incurs a net cost by accepting returns. We also show that an MBG enhances the profit of the manufacturer with low satisfaction rate, resulting in an increase in both the wholesale price and demand, but it has an opposite impact on the manufacturer with high satisfaction rate. In addition, an MBG enhances the retailer's profit and expands the overall market. Numerical examples are included to illustrate the major results.

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1. Introduction

Efficient distribution of the product to customers in a supply chain can be as critically strategic as developing the product itself, from the perspective of supply chain management (Tsay & Agrawal, 2004). It is a very common observation in the retailing industry that most retailers offer several different brands of a given product (Teng, Laroche, & Zhu, 2007). A store sells appliances with different brands supplied by different manufacturers, such as Vitamix blenders and Oster blenders, Lenovo laptops and Toshiba laptops, Antler luggage and Tumi luggage. It is also common for retailers to expect different customer returns rates for different brands.

Customer returns prevail in the retailing industry. Accepting returns of products that do not meet the customer's taste or expectations is an efficient way to retain customer loyalty and maintain customer satisfaction (Schmidt & Kernan, 1985; Suwelack, Hogreve, & Hoyer, 2011). According to a National Retail Federation (2014) report, the average customer returns rate in 2014 was 8.9 percent, and total merchandise returns accounted for almost dollar 284 billion for US retailers in 2014. For those products distributed through e-tailers or mail orders, the returns rate can be as high as 35 percent (Guide, Souza, Van Wassenhove, & Blackburn, 2006); for catalogue retailers of fashion items, it can be as high as 75 percent (Mostard & Teunter, 2006). Among returned products, non-defective consumer returns are significant (Ferguson, Guide, & Souza, 2006). Returns rates vary according to categories and brand image. Customers are less likely to return a product if they are loyal customers of a brand, since previous experience with the brand mitigates pre-purchase uncertainty over such questions as sizing or quality. (That is, the customer's pre-purchase expectations are based on experience of the brand, with the result that the customer is less likely to be disappointed and return the product.) Customers are more likely to return a product if they purchase a brand they are unfamiliar with. In practice, various returns policies have been adopted to manage customer returns. Money-back guarantee (MBG) is the most popular policy (Akçay, Boyaci, & Zhang, 2013; Davis, Gerstner, & Hagerty, 1995); it allows customers to return a product to the retailer for a full refund. In order to improve customer satisfaction and boost sales in the current

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hyper-competitive environment, more and more companies, including Superstore, Sears, and Canadian Tires, are promising a full refund return policy (Chen & Bell, 2013).

As argued by Shulman, Coughlan, and Savaskan (2011), customer returns policies can attract customers' attention and positively influence their purchase decision, but it is costly to handle the returned product. It is estimated that U.S. companies spend over dollar 200 billion per year on managing product returns (Grimaldi, 2008). The U.S. electronics industry alone spends about dollar 14 billion a year on repackaging, restocking, and reselling returned products (Petersen & Kumar, 2010). Biederman (2005) studied the data released by the Center for Logistics Management at the University of Nevada, and reported that the top 30 non-grocery retailers spend around dollar 53 billion on the returned merchandise annually. Wal-Mart alone processes some dollar 6 billion per year in returns. Accepting product returns further costs U.S. manufacturers and retailers approximately dollar 100 billion annually in lost sales and reverse logistics, reducing profits by 3.8 percent on average per retailer or manufacturer (Blanchard, 2007). Thus, customer returns is a two-edged sword, and there is obvious value in developing strategies to balance the benefits and the costs, though this is a complex and challenging process.

Choice of brands of product influences not only the retailer's profits (Levy, Grewal, Kopalle, & Hess, 2004; Moorthy, 2005), but also the supply chain channel structure (Chen, Ding, & Ou, 2014). Facing customer returns, selecting brands of product becomes even more important and challenging. Obviously, competition among manufacturers will have significant impact on the decisions of the supply chain in the presence of customer returns. The motivation of this paper is to explore the impact of customer returns in a supply chain with two manufacturers supplying two brands of product to a common retailer. Specifically, we examine: 1) How and when should the retailer choose one or the other or both manufacturers' product(s)? 2) Should an MBG be offered in the supply chain or not? 3) Can the first mover's benefit outweigh the negative impact of MBGs for the manufacturer with a higher satisfaction rate? To answer these questions, we develop a supply chain model in which two brands of product are differentiated by customer satisfaction rates (or returns rates) and production costs. The supply chain involves vertical competition, as the two manufacturers are Stackelberg leaders, while the retailer is the follower in the supply chain. It is common in many supply chains that manufacturers act as a leader, although some large retailers (such as Walmart) play the leader role in some supply chains. In addition, our supply chain also involves horizontal competition between the two manufacturers, as the manufacturer with the well-known brand and a low returns rate is a Stackelberg leader, while the other manufacturer, with a new brand and a high returns rate, is a follower in deciding the wholesale price.

We offer several new insights into the problem. First, we clearly identify the factors and the conditions under which a brand should be chosen. We show that in certain circumstances, the retailer prefers to select both manufacturers and carry both brands, even though one brand of product may have no sales. Second, we show the conditions under which the supply chain should choose an MBG returns policy or a no returns policy. We find that the choice of returns policy for the supply chain depends only on whether or not the retailer can recover the value of the returned products efficiently, even when the retailer incurs a net cost for accepting returns. An MBG should be offered for both brands if the net salvage value is positive. We also show that an MBG enhances the profit of the manufacturer with the low satisfaction rate, resulting in an increase in both the wholesale price and demand, while it has the opposite impact on the manufacturer with the high satisfaction rate. Third, we show that the advantage of the first mover cannot offset the disadvantage of the MBG in the competition, as the manufacturer with the high satisfaction rate and low returns rate suffers from the MBG, even as a Stackelberg leader.

The rest of this paper is organized as follows. We review the relevant literature in Section 2. Section 3 briefly introduces assumptions and notation used in the paper. Section 4 focuses on the benchmark case, in which the retailer chooses an exclusive single manufacturer. Section 5 provides major equilibrium results for the supply chain game model if the retailer selects both manufacturers. We discuss the implementation of an MBG returns policy in the supply chain. Section 6 identifies the conditions under which the retailer should select either a single manufacturer or both manufacturers, and discuss some managerial implications. Section 7 discusses the impact of the MBG on the prices, demands, and profits of the manufacturers and the retailer. We summarize the major results of the paper and provide additional managerial insights in Section 8. All proofs are presented in the Appendix.

2. Literature review

This paper is related to the literature on supplier selection, channel structure and competition, and customer returns policy.

Selection of suppliers has been extensively studied in the operations management literature, with focus mainly on supplier selection criteria (for example, Swift, 1995; Weber, Current, & Benton, 1991), supplier evaluation and selection approaches (for example, Kumar, Jain, & Kumar, 2014; Nair, Jayaram, & Das, 2015), and integration with other supply chain optimization problems (for example, Kheljani, Ghodsypoura, & O'Brien, 2009; Li & Zabinsky, 2011). To distinguish from operational supplier selection criteria, Nair et al. (2015) argued that the strategic aspects of supplier selection are important. Kumar et al. (2014) proposed Green Data Envelopment Analysis (GDEA) with carbon footprint monitoring. Kheljani et al. (2009) considered the combination of supplier selection and coordination models to optimize the benefits to all the members and alignment of decisions among the participants in a supply chain. None of the above studies consider customer returns in the context of supplier selection.

Channel structure, especially pricing power, has received considerable attention in both academic studies and industry (Choi, 1991, 1996). Most studies in this area examine the efficiency of the channel structure and coordination of the supply chain under different channel structures. Choi (1991) examined how channel profits of manufacturers and the retailer vary in the vertical Nash channel interaction or in channel interactions that depend on who is the Stackelberg leader or follower. He found that under linear demand, all channel members and customers are better off when no-one dominates the market. In a duopoly common retailer channel, Choi (1996) found that while (horizontal) product differentiation helps manufacturers, it hurts the retailers. Yao and Liu (2005) considered price competition under vertical Nash and manufacturer's Stackelberg games for a dual channel structure with a retailing channel and an e-tailing channel. Under the assumption that unit marketing expenditure and unit price charged by the buyer influence demand, Esmaeili, Aryanezhad, and Zeephongsekul (2009) discussed manufacturer's Stackelberg and retailer's Stackelberg non-cooperative games. Chen and Bell (2013) compared the impact of customer returns on the decisions and profits of the manufacturer and the retailer under various types of channel interaction.

Previous studies, however, have not considered supplier selection in the context of the retailer's ability to efficiently distribute different brands of product, or the question of the retailer's optimal returns policy. In the present paper, we address these issues by considering a supply chain consisting of two competing manufacturers and a common retailer, in the presence of customer returns. The retailer can offer either an MBG or no MBG policy.

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