

## Chapter 63

# Competition and Coordination in a Dual-Channel Supply Chain With Asymmetric Retailers

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### **ABSTRACT**

*This article studies competition and coordination in a dual-channel supply chain where one supplier supplies homogeneous products to multiple asymmetric retailers, meanwhile, selling products to the end consumers acting as retailers, through a two-level Stackelberg game. This article first studies the asymmetry among the retailers in terms of the different characteristics of the cost, price, quantity. This article finds that a supplier's profits increase when the number of retailers are high enough in the retail market, even though the retail price of the retailers is lower than that of the supplier, or the wholesale price is cut down when there are many retailers competing in the retail market. On the other hand, under certain conditions, the efficiency of supply chain goes to 1. In this article, the authors show that some traditional contracts that can perfectly coordinate the single-channel supply chain, while failing to coordinate the dual-channel supply chain. Therefore, this article puts forth a linear quantity discount contract and first proves it can be applicable to the dual-channel supply chain with asymmetric retailers under a certain special condition where the lead retailer exits the retail market. The authors examine contracts which can reduce the loss of the efficiency, though they cannot completely coordinate a dual-channel supply chain.*

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## **1. INTRODUCTION**

As the fast-moving superstores, e.g. Walmart, the Hua-lian supermarket and other specialty superstores, give retailers significant power to attract consumers in the recent two decades, these retailers capture a percentage of the profits of middleman, in which way suppliers sell to the downstream retailers. Due to the maximization of profits, except the way that is aforementioned, suppliers choose to face the end consumers directly to get the portion of profits obtained by shrinking the supply chain, like Nike and Apple, they have their own brick-and-mortar stores. The way that many suppliers have engaged in selling directly to the consumers online helps manufacturers save cost, increase sales revenue and open up new markets (Chen 2012), and has significant influence on the patterns of customers' purchase. Consequently, many suppliers satisfy demand from the segment market through dual-channel supply chain, to compensate the portion of market segments which the indirect channel can't reach. While the price provided by the suppliers is higher than that from the retailers, especially the network marketing platform in the real world. So why do suppliers sell products to retailers who sell the same titles in a lower price? In this study, we investigate the motivation of one supplier who sells products they produce to retailers with which they also compete by a direct channel. we propose the source of product comes from only one supplier, and without loss of generality, allow for the differences at the retail level in both the product itself and the consumers' preference in purchasing one retailer or the others.

Of particular interest is the retailers presented in our paper, which we propose there is relatively only a bigger one than others about the comprehensive market competitiveness. When these retailers are asymmetric, the externality imposed by one retailer will have an influence on the others, and lead to the loss of profits in the supply chain (Dimitris 2013). we first analyze the equilibrium of the pricing and quantity strategies between one supplier and multiple asymmetric retailers through two-level Stackelberg game in which supplier is leader and retailers are followers, and in the second level the bigger retailer is leader and the other retailers are followers which we propose as symmetry. In addition, we find the common contracts cannot coordinate dual-channel supply chain by comparing with revenue sharing contract (RSC) and price discount sharing (PDS), which they are apt perfectly to traditional single channel supply chain, and then we suggest an effective contract, that is linear quantity discount contract (QDC).

This paper focuses on competition and coordination in a dual-channel supply chain with asymmetric retailers through two-level Stackelberg game. And there is vast literature related to dual-channel supply chain. Thus, in the following, we will elaborate literature including dual-channel supply chain competition, RSC, PDS, linear QDC and coordination and equilibrium between one upstream supplier and multiple downstream retailers which are reviewed and analyzed.

## **2. LITERATURE REVIEW**

The literature related to dual-channel supply chain mentioned by Tulika et al. (2015) comes down to two streams related to both channel competition and coordination dealing with the various contracts within supply chain.

Some scholars have studied channel competition since the 1980s, one of who suggested a simple framework indicating the competition is the function of channels, within which including the nature of channel structure and demand (Jeuland 1983, Farooq et al. 2005). The research on the channel competition has opened the prelude since then. Chiang et al. (2003) suggested that retailers can capture profits from

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