



Markup pricing strategies between a dominant retailer and competitive manufacturers

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ABSTRACT

Markup pricing contracts have been widely employed in many industries. Under such contracts, a retailer charges a retail margin over the wholesale price levied by the supplier to guarantee her financial prudence. In a setting where two competitive manufacturers sell substitutable products through a common dominant retailer, we investigate and compare performance of two different markup arrangements, namely, percentage and dollar, under the deterministic and stochastic demand situations, respectively. We find that, no matter what the demand characteristic is, when the retailer switches from dollar to percentage markup, the retailer makes a higher profit while the manufacturers suffer, because the switching forces manufacturers charge lower wholesale prices and thus leads to lower retail prices. Moreover, under the deterministic demand situation, the switching brings about a larger order quantity and a higher channel profit. Under the stochastic demand situation, however, the effect of the switching on order quantity and channel profit depends on manufacturer differentiation and retailer efficiency: order quantity (channel profit) becomes smaller (lower), as manufacturer differentiation becomes weaker or retailer efficiency becomes higher. And, the demand uncertainty intensifies the effect.

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1. Introduction

Markup pricing contracts have been widely employed in many industries. For example, in Nobel and Gruca's (1999) survey conducted among US marketing executives, 56% of the respondents indicated that markup (or "cost-plus") pricing was the most often used pricing strategy. One intuitive explanation for this popularity is that a "normal" markup over cost (or "profit margin") provides a simple guide to profitability and hence financial prudence (Nagle & Hogan, 2006).

The past several decades saw the increasing prevalence of not only very large retail chains, but also outsourcing by international brand-owners to manufacturers in developing countries. This indicates that, the channel power is shifting towards downstream. For example, *guaranteed retail profit margin* (or markup) is regarded as a clear demonstration of retailer power (Krishnan & Soni, 1997). Therefore, more and more market structures are characterized by a Stackelberg-dominant retailer who leads by imposing a markup (see, e.g., Choi, 1991; Ertek & Griffin, 2002; Lau, Lau, & Wang, 2008, among many others). In other words, a dominant retailer

stipulates a markup to cover her cost and ensure her profitability, no matter what the wholesale price w charged by the upstream manufacturers for their products is. A dominant retailer can declare her markup in two variations. That is

- (i) "Percentage-markup" (hereafter "%-markup", label [%]); e.g., "30% of w "; or
- (ii) "Dollar-markup" (hereafter "\$-markup", label [\$]); e.g., "\$3/unit above w ".

Dollar or percentage markup scheme appears to be arbitrarily chosen in academic research, though %-markup is most often adopted in textbooks of business (e.g., Levy & Weitz, 2009, p. 420). A random check shows that some authors assumed the \$-markup format (e.g., Jeuland & Shugan, 1988; Lee & Staelin, 1997), while others assumed the %-markup format (e.g., Arcelus & Srinivasan, 1987; Liu & Cetinkaya, 2009). Typically, little justification is given for choosing the particular markup variation in those theoretical models. It is obvious that the two markup variations make no difference in a single-firm setting. However, few studies examine the difference between the two variations in a two-echelon channel. Our goal is to investigate the effect of markup formats on the decision-making of supply chain members and the channel performance.

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To this end, this study considers a simple supply chain where a single retailer (she) offers a markup purchasing contract to two competitive manufacturers; the latter two respond by quoting unit wholesale prices. Finally, the order (production) quantity is decided on. Our model includes two demand types: deterministic and stochastic. With stochastic demand, we assume that the manufacturers make order quantity decisions and bear all risk associated with mismatch between supply and demand, considering the popularity of consignment practices (see, Wang, Jiang, & Shen, 2004). Our research quantifies the benefits to all members of the supply chain under different markup pricing settings and helps to identify which contract is most beneficial to the entire channel as well as the different parties involved.

We will show that, when the retailer switches from \$- to %-markup, the retailer's profit increases while the manufacturers' profits decrease, because %-markup imposes more pressure on manufacturers to reduce their wholesale prices and leads to lower retail prices. This is true regardless of whether the demand is deterministic or stochastic. Our study further finds that %-markup can bring a larger order quantity and a higher channel profit under the deterministic demand situation. Under the stochastic demand situation, however, whether this findings hold depends on manufacturer differentiation and retailer efficiency. Both strengthening manufacturer differentiation and reducing retailer's cost can make a smaller order quantity and a lower channel profit. And, the demand uncertainty can intensify the effect.

The rest of this paper is organized as follows. Section 2 provides a brief review of related literature. Section 3 formulates the model, presents equilibrium results for two markup pricing schemes, and compares their performance under the deterministic and stochastic demand situations, respectively. Section 4 concludes and suggests future research directions. The Appendix contains the detailed mathematical proofs for Proposition 1 to Proposition 5.

2. Literature review

The problem considered in this paper draws ideas from three research areas: (1) supply chain coordination, (2) markup pricing schemes and (3) manufacturer competition. We briefly review relevant literature in these areas.

2.1. Supply chain coordination

Since the adverse effect of “bullwhip” on the whole distribution channel performance was identified, the literature on supply chain coordination has studied various contractual forms to combat it in all kinds of channel structures, such as buy-back, revenue sharing, sales rebate and quantity discount, see Cachon (2003) and Govindan, Diabat, and Popiuc (2012) for a comprehensive review. Moreover, the overwhelming majority of these studies has focused on a channel structure of a Stackelberg-dominant manufacturer (or upstream member). However, as large retail chains become increasingly prevalent and international brand-owners gradually outsource their purchasing or production to manufacturers in developing countries, the channel power is shifting to downstream channel members and thus the issues about dominant downstream members have been recently discussed. Our study is based on a setting with a dominant retailer.

The simplest and most common contract formats are price-only contracts (wholesale-price contracts), in which the dominant manufacturer leads by declaring a unit wholesale price. Although the price-only contract cannot coordinate the supply chain due to its double marginalization effect, it is still one of the most-often used contracts in practice due to its simplicity, and has drawn a lot of attention from both industries and academia. As a supposed mirror

image of the price-only contract, the markup contract, in which the dominant retailer leads by imposing a markup, has two variations: dollar and percentage. The difference between the two markup schemes is what we want to examine.

2.2. Markup pricing schemes

Although there are numerous studies considering markup pricing schemes, most of them only focused on either %-markup or \$-markup but failed to identify the significant difference between the two formats. The exceptions are Irmen (1997), von Ungern-Sternberg (1999), and Tyagi (2005). Irmen (1997) considered a situation where neither the retailer nor the manufacturer dominates. Under a simultaneous Nash (instead of a Stackelberg) game, he found that, relative to the traditional \$-markup, using %-markup leads to higher retailer's profit and lower final prices. Tyagi's (2005) model involves a Stackelberg-leading retailer facing multiple manufacturers who are in a Bertrand-Nash competition among themselves. He showed that the retailer prefers %-markup over \$-markup. The two aforementioned papers assume a general demand curve, which hindered them in obtaining further results (e.g., manufacturer's profit and retail price). By assuming an iso-elastic demand curve, von Ungern-Sternberg (1999) was able to show further that switching from \$-markup to %-markup also leads to a higher channel profit. Note that all the three aforementioned studies considered only the deterministic demand situation. Our current paper extends the above-mentioned works not only by obtaining more detailed results for the deterministic demand case, but more importantly, we obtain results for the stochastic demand case and clarify how %- and \$-markups perform differently under different demand situations.

2.3. Manufacturer competition

The literature on the supply chain structure with multiple competitive manufacturers selling to a common retailer is very rich, but most of the literature examined different problems from ours. For example, Choi (1991) and Lee and Staelin (1997) focused on the effect of different channel power structures, where the markup format is assumed to be dollar. Cachon and Kok (2010) compared the performance of wholesale-price contracts under different supply chain structures: one-manufacturer versus multiple competitive manufacturers, in which the Stackelberg-leader is manufacturer. Martinez-de-Albeniz and Roels (2011) dealt with how to optimally allocate limited shelf space to competitive suppliers. The most relevant is Zhao and Shi (2011), in which the authors compared performance of two supply chain contracts: consignment with revenue sharing contract and wholesale-price contract. However, Zhao and Shi (2011) assumed that two contracts have different power structures: dominant retailer for consignment with revenue sharing contract, and dominant manufacturer for wholesale-price contract, whereas we compare the performance of two markup pricing schemes based on one common power structure – dominant retailer.

3. Model and equilibrium results

3.1. Model assumptions

Consider a supply chain with two manufacturers and one retailer. We assume that two manufacturers (M_1 and M_2) provide substitute products and sell them through a common retailer (R). Manufacturer i produces at a constant unit cost of c_i , $i = 1, 2$, and the retailer incurs a unit cost of c_0 for handling and selling products to consumers.

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