

On eBay's Fee Structure from a Channel Coordination Perspective

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Abstract. Can eBay.com's fee structure coordinate the channel? It's a critical strategic problem in e-commerce operations and an interesting research hypothesis as well. eBay's fees include three parts: monthly subscription fee, insertion fee, and final value fee (i.e., a revenue sharing portion), which represent a generic form of revenue sharing fee structure between the retailer and the vendor in a supply chain. This research deals with such a channel consisting of a price-setting vendor who sells products through eBay's marketplace exclusively to the end customers. The up- and down-stream channel relationship is consignment-based revenue sharing. We use a game-theoretic approach with assumption of the retailer (i.e., eBay.com) being a Stackelberg-leader and the vendor being a follower. The Stackelberg-leader decides on the terms of revenue sharing contract (i.e., fee structure), and the follower (vendor) decides on how many units to sell and the items' selling price. This study formulates several profit-maximization models by considering the effects of the retail price on the demand function. Under such settings, we show that eBay's fee structure can improve the channel efficiency; yet it cannot coordinate the channel optimally.

Keywords: Channel Coordination, Revenue-sharing, Consignment, Wholesale-price-only, Game Theory

1. INTRODUCTION

Can eBay.com's fee structure coordinate the channel effectively and optimally? It's a critical problem in internet commerce and an interesting research hypothesis as well. eBay's marketplace includes auction-style and fixed-price formats, which relies on a large amount of third-party affiliated vendors selling goods through its web-stores. The vendors decide on how many units to list and the items' selling price, and retain ownership of the goods. eBay charges vendors by collecting an up-front, lump-sum side payment and a price-dependent commission fee, i.e., the final value fee. For each item sold, eBay deducts an agree-up percentage from the revenue and remits the balance to the vendor. It is essentially a consignment contract with revenue-sharing, where the R-S percentage is a price-decreasing function. Table

1 summarizes the current final value fee as a percentage of revenue charged by eBay to its affiliated vendors for the book, music, and DVD category, where it collects 15.00% of the initial \$50.00, plus 5.00% of the initial \$50.01-\$1,000.00, plus 2.00% of the remaining closing value balance.

Motivated by such a business model, this paper intends to answer the following questions in eBay's fixed-price trading format or so-called internet catalog sales: can its fee structure coordinate the channel effectively and efficiently? Does the channel conducted by such a contractual arrangement outperform the prevalent wholesale-price-only (W-P-O) arrangement or the fixed R-S ratio practice that is well-adopted in e-retailers like Amazon.com? If not, does it persist in certain decision bias that leads to a lower profit and channel inefficiency? We model the decision-making of the two firms in a verti-

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cally separated channel as a Stackelberg leader-follower game and carry out equilibrium analysis. The downstream retailer, e.g., eBay.com, acts as the leader offering the upstream vendors a take-it-or-leave-it revenue sharing contract, which specifies the percentage allocation of sales revenue between herself and the vendor. The vendor acts as a follower who sets a self-interest retail price as a response. We assume the vendor is a price-setting firm who sells the one-of-a-kind product in the market through the exclusive channel, and the demand is price-sensitive.

Table 1. eBay's final value fee for the book, music, and DVD category (Source: eBay.com).

Price	Final Value Fee
Item not sold	No Fee
\$0.01~\$50.00	15.00% of the closing value
\$50.01~\$1,000.00	15.00% of the initial \$50.00, plus
	5.00% of the remaining closing value balance (\$50.01~1,000.00)
Equal to or Over \$1,000.01	15.00% of the initial \$50.00, plus
	5.00% of the initial \$50.01~\$1,000.00, plus 2.00% of the remaining closing value balance (\$1,000.01~closing value)

While inspired by e-commerce practices, revenue sharing is also widely adopted in a variety of industries, including the video rentals (e.g., Dana and Spier, 2001; Mortimer, 2008; Cachon and Lariviere, 2005) and the retailing with consignment contracting (Coughlan *et al.*, 2001; Turesik, 2002). Other revenue-sharing examples can be found in the mobile networks with independent content providers (Foros *et al.*, 2009), the assembly systems with vendor-managed inventory (Gerchak and Wang, 2004), and the chain stores with franchising arrangement, e.g., fast-food, hotel, automobile rentals, and gasoline dealerships (Lal, 1990).

In what follows, we provide a review on the revenue-sharing literature, which can be broadly classified as R-S with and without consignment contracting. Under the non-consigned contract, the manufacturer offers the retailer a two-part contract (w, r) where $0 < r < 1$, by charging a lower wholesale price w in exchange for a $(1 - r)$ percentage of the retailer's revenue. The retailer then determines a self-interest replenishment quantity (or a stocking factor) and/or retail price (Cachon and Lariviere, 2005; Gerchak *et al.*, 2006; Van der Veen and Venugopal, 2005; Chauhan and Proth, 2005; Koulamas, 2006; Yao *et al.*, 2008a, 2008b). Such setting with somewhat variation is widely applied in the video rentals (Dana and Spier, 2001; Mortimer, 2008; Cachon and Lariviere, 2005; Gerchak *et al.*, 2006; Van der Veen and Venugopal, 2005) and the internet content services (Foros *et al.*, 2009). The non-consigned R-S arrangement is also an effective mechanism for collaborative new product development in intercompany alliances

(Bhaskaran and Krishnan, 2009). Some work in this stream deals with agent-based negotiation systems (Giannoccaro and Pontrandolfo, 2009), three-staged supply chain (Giannoccaro and Pontrandolfo, 2004), two-period newsvendor problem (Linh and Hong, 2009), and the effect of joint adoption of R-S and advanced booking discount programs (Bellantuono *et al.*, 2009).

Under consignment contracting, the retailer offers the manufacturer an R-S percentage, and the manufacturer responds by setting the stocking quantity and/or the retail price (e.g., Gerchak and Wang, 2004; Wang *et al.*, 2004; Li and Hua, 2008; Li *et al.*, 2009; Ha and Tong, 2008; Chen *et al.*, 2009). For the manufacturer dominance setting in Ru and Wang (2010) and Pastermack (2002), the models are mathematically equivalent to the buyback or return policy in a supply chain. However, the aforementioned literature does not consider the contractual design with a price-dependent R-S ratio, which is not only theoretical advanced but more practical in internet commerce and business operation. We consider such an R-S function in the research stream. The price-dependent profit sharing model proposed by Foros *et al.* (2009) is spiritually close to our model. They dealt with the information goods in a mobile network channel with multiple independent content providers, so that the marginal variable production and retailing costs are negligible and the profit function is greatly simplified. We deals with the physical and one-of-a-kind goods, and do consider the unit variable production cost by the vendor and unit variable merchandizing cost by the retailer.

Our contribution to the literature is two folds. Firstly, the problem being studied is unique and probably is the first attempt in the revenue-sharing research. We consider a price-dependent R-S function in a vertically separated channel setting, which is also a generic version of the constant R-S models. Secondly, our analysis provides fertile managerial implications. We found the price-dependent function always underperforms than the constant R-S function, and only outperforms the traditional W-P-O model under certain conditions, e.g., a higher retailer's cost-share ratio in the channel or a lower price-sensitivity coefficient of R-S function. Our finding suggests that the more complex revenue-sharing function does not generate higher channel profit and may be unworthy of adopting.

In the remainder, we describe the problem context and a base model. Next, the mathematical models are formulated and equilibrium analyses are carried out for both the decentralization regimes with wholesale-price-only, price-independent, and price-dependent revenue-sharing contractual arrangements. Based on the analytical results, managerial implications are drawn concerning with the tendencies of decision variables and profit values generated by various channel settings. Numerical study is then carried out to quantify the analytical results. In conclusions, we summarize our research contributions and provide future research directions.