



Interfaces with Other Disciplines

“Do the electronic books reinforce the dynamics of book supply chain market?”—A theoretical analysis

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ABSTRACT

In this paper, we develop a set of mathematical models to examine and compare different pricing and launch strategies of electronic books (e-books) under two types of copyright arrangements, namely the royalty and buyout arrangements. We conduct a sensitivity analysis to assess how various market structure parameters influence the publisher's pricing options in different copyright, launch modes, and channels of distribution. Aimed at gaining managerial insights into the complex issues in pricing and launch strategies involving e-books, we recommend optimal launch strategies and pricing decisions for the e-book supply chain.

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1. Introduction

“The printed word is in the midst of a revolution. Digital books are gaining ground on their dog-eared, bookmarked counterparts and experts predict e-books could seriously challenge traditional tomes in just two years. By 2012, three in every 10 books could be delivered digitally, according to booksellers, and publishers are fuelling the transition by adding more back-catalogue books and story types to the mix. After a slow start, the e-book revolution is now well under way” (Herald Sun on 05 January 2011).¹

The fast penetration of electronic commerce in the publication industry has profoundly transformed the structure of the book market, and stimulated a tremendous growth in the industry. While the printed book (p-book) sales have steadied or even plummeted, particularly in some countries, such as Japan and China (Economist, 2007; Du8.com, 2010), the electronic book (e-book) sales in recent years are soaring. As the International Digital Publishing Forum reported, e-book sales were up from US\$6 million in 2002 to US\$20 million in 2006 and reached a staggering US\$31.7 million in 2007 registering a 23.6 percent growth over 2006 (Vasileiou, Hartley, & Rowley,

2009). The worldwide e-book sales grew more than two folds between February 2010 and February 2011 (Sporkin, 2011), and it is projected to account for about half of the total book sales by the year 2020 and around 90 percent of total book sales by the year 2030 (Ojala, 1998).

The prosperous yet diversified book markets provide great business opportunities while also bring up challenges to the stakeholders involved in the book supply chain. The major issues for the book supply chain to resolve in recent years include: the format of the book, the selection of delivery channel, launch timing for different channels, the access platform, and the pricing policy. Among these, timing of launch and pricing of e-books are two most important challenges to the book marketers. As Ojala (1998) points out “*The greatest enigma in the on-line world remains pricing and it's amazing that, after a quarter-century of information being sold online, no one has a definitive pricing model.*” Many publishers are trying out different pricing strategies to stay alive in the market and to compensate for their falling hard cover and paperback printed book sales revenue (Ming, 2000). Take Amazon, the most popular book seller in the world, as an example. One case is on simultaneous launch mode that Amazon simultaneously sells the hardcover and kindle edition of “Finger Lickin’ Fifteen”, the kindle edition of the book costs \$22.36 and is \$6.99 more than that for the hardcover version.² However, on book “The King of Kahel” (by Tierno

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E-mail address: liyongjian@nankai.edu.cn (Y. Li).¹ Refer to <http://www.heraldsun.com.au/archives/old-news-pages/e-books-begin-a-new-chapter/story-fn5bodi-1225982366532>.² <http://www.amazon.com/Finger-Lickin-Fifteen-Stephanie-Novels-ebook/dp/B002FB68CG>.

Monénemb), whose paperback and electronic edition released simultaneously, Amazon priced the paperback edition at \$15.95, which is more than the e-book at \$9.99.³ The other case is on lag launch mode, for example a thriller novel by Conrath in 2008, Amazon priced the paperback edition of the book at \$14.9 while lag launched e-version of the book at \$2.99.⁴ Such a context raise a question being addressed in this research: how does the publisher optimize the timing of launch in terms of e-book and p-book, and in different launch modes, what is the pricing strategy the publisher should apply in this context?

The electronic channel structure is undergoing a serious change as it attracts more and more retailers venturing into the electronic channel and adopting different sales and pricing models. Many factors, external and internal, such as markets, organizational structures, pricing and launch schedule, have significant impacts on the performance of the digital distribution of books. Often, these factors individually or in combination lead to conflicts of interests among the digital supply chain members. Therefore, it is critical to analyze how the retailers and publishers make the pricing and supply decisions in a dynamic e-book market. While the extant literature reports on analyses of pricing and distribution strategies of book distribution channels in isolation, to the best of our knowledge, no report is available that considers the pricing and launch strategies of different book distribution models in combination.

This paper is intended to present the analyses of the pricing and launch strategies of e-books adopted by the major stakeholders in the book supply chain, by mathematical modeling. We formalize the model with three important dimensions: centralized versus decentralized decision making in pricing a book, simultaneous versus lag launch of e-book and p-book, and royalty versus buyout copyright model. The combinations of these three pairs of factors can result in eight book selling patterns with differentiated pricing strategies. These theoretical models help analyze publishers' and retailers' launch and pricing strategies, and assess the sensitivity how the market structure parameters influence the publishers' choice in different copyright and launch modes. These studies are aimed at gaining managerial insights into the complex issues involving pricing and launch strategies.

This is how rest of the paper is organized: in Section 2 we provide a brief background of existing book selling models with the relevant literature. The research problem is described in Section 3 followed by our theoretical models in Section 4. Our numerical study, and analyses of results are presented in Sections 5 and 6 respectively. We conclude with mention of few limitations and probable further extensions of this paper.

2. Literature review

Qualitative studies on e-book have focused on topics such as e-book conception, related technology issues, comparison with p-book, and predicting the e-book market's future (Hua, Cheng & Wang, 2011; Mooney, 2001; Yong, 2009). Quantitative research has mostly looked at effects of piracy and digital rights management (DRM) on the price in e-books market. Sundararajan (2004) presents a model to analyze the strategic pricing choices of legal digital goods in the presence of piracy, and reports that a seller's optimal policy is either to provide the technologically maximal protection level against piracy, or to price discriminate at a strictly lower level of protection. This work was extended by Oestreicher-Singer and Sundararajan (2010) to analyze the strategic pricing choice of digital goods in the presence of a physical substitute in addition to a pirated version, and to examine the effect of having such a physical substitute alongside the pirated

version. A related study of digital experience goods can be found in Khouja and Park (2007). Shiller and Waldfogel (2011) discuss other possible pricing schemes, including uniform pricing and bundling. All these above mentioned studies on digital pricing with the focus on piracy and digital rights management are conducted in the way similar to the competitive pricing problem in traditional dual-channel supply chain. Not many reports are found on dual-channel supply chain involving a digital or electronic channel of distribution which is the focus of this study.

Several studies in marketing literature consider the dual-channel competitive pricing scheme such as dual channel problem with prices competition (Kurata, Yao, & Liu, 2007), dual retail channel problem with price and non-price competition (Iyer, 1998), dual retail channel problem with price and service competition (Tsay & Agrawal, 2000), and dual-channel coordination in the presence of dominant retailer (Raju & Zhang, 2005). However, differing from the previous dual and/or multiple retailing channel analysis, we consider a mixed system where the publisher (manufacturer) sells the e-book directly, and distributes the p-book through the traditional retailer, and we discuss decision sequences derived from the publishing model for both types of books.

There is a plethora of papers on dual-channel supply-chain design in the operation management (OM) literature. Balasubramanian (1998) presents a formal analysis of conflict between the direct and traditional channel via a mail versus mall dual-channel problem. Yao and Liu (2005) examine the pricing equilibrium between a manufacturer with an e-tail channel and retail channel under two types of competitive pricing schemes, and specifically investigate the demand diffusion between the e-tail channel and retail channel. Chiang, Chhajed, and Hess (2003) develop a pricing-setting model between a manufacturer and its independent retailer for studying the dual-channel design with customer acceptance of direct channel. Bernstein, Song, and Zheng (2009) discuss the free riding phenomenon in multi-channel supply chain. Matsui (2012) investigates a channel design problem concerning whether duopolistic firms competing in a product market should vertically integrate or separate their marketing channels. In this paper, we model the dual channel design in the book supply chain, and discuss the book publishing order in the electronic channel and traditional retail channel. Furthermore, we consider the competitive pricing policy in different copyright models, publishing models, and market structures.

Our work is also related to the study of pricing policy in dual channel. Chun and Kim (2005) analyze pricing strategies between conventional offline firms and online firms, and particularly examine the effect of the market size and product characteristics on price differences between offline and online channels. They find that under certain conditions, the prices in online firms tend to be higher than in conventional offline firms. Cattani, Gilland, and Swaminathan (2006) investigate a manufacturer's pricing strategy when adding a direct channel and suggest that a selected-wholesale-price equal-pricing strategy is optimal. Hua, Wang, and Cheng (2010) also study a similar dual channel problem with delivery lead time, and find delivery lead time strongly influences the manufacturer's and the seller's pricing strategies. Yao and Liu (2005) extend a dual channel problem to analyze the price competition in both Bertrand and Stackelberg game models. Tsay and Agrawal (2000) discuss the pricing Nash competition between two downstream retailers, and service competition. However, this range of research is limited to the traditional dual-channel supply chain. In our context, e-book is different from the general product in a sense that it almost has indefinite capacity with no inventory and with almost non-existent variable production cost. In particular, the e-book has the problem of special copyright issue, and DRM has a significant financial impact on the e-book price (2010). Therefore, the pricing policy of e-book in dual channel has to be considered in a different way from that of traditional books to a large extent. A more related recent study is by Hua et al. (2010), in which

³ <http://caribbeanbookblog.wordpress.com/2010/05/27/amazon-and-barnes-noble-give-writers-more-publishing-options/http://info.printing.hc360.com/2010/10/111029268092.shtml>.

⁴ <http://jakonrath.blogspot.com/2011/12/guest-post-by-elle-lothlorien.html>.

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