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Adding pay-on-delivery to pay-to-order: The value of two payment schemes to online sellers

Na Xu[a], Shi-zhen Bai[b,*], Xiang Wan[c]

[a] School of Business Administration, Shandong Institute of Business and Technology, China
[b] School of Management, Harbin University of Commerce, China
[c] Fisher College of Business, The Ohio State University, OH 43210, USA

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ABSTRACT

In this study, we focus on two main payment options in e-commerce: pay-to-order (consumers pay for products when making an order online) and pay-on-delivery (consumers pay for products after delivery). While pay-to-order is the basic payment option in e-commerce, pay-on-delivery becomes more welcomed by consumers as an additional option. Using analytical modeling, we characterize the e-tailer's optimal pricing and inventory decisions under two scenarios: 1) only with pay-to-order, and 2) dual payment scheme (both with pay-to-order and pay-on-delivery). Based on the optimal operation strategy, we compare the e-tailer's profit under these two scenarios and find the best time for e-tailer to offer each payment scheme. Finally, numerical examples are given to prove the theory results and provide management suggestions for e-tailers to improve performance.

1. Introduction

Online shopping has been increasing in recent years especially in China, where the e-commerce market was $1188.36 billion in the first quarter of 2015 (iResearch, 2015). However, in spite of the increase in online shopping, many problems remain that contribute to an unsatisfactory shopping experience for customers. The proportion of online customer complaints were 52.38% of all complaints in China in 2013 (CECRC, 2013). Difficulties in making returns and obtaining a refund are the most common customer complaints. These experiences significantly decrease the shopping experience quality of customers. Furthermore, the perceived online risk is higher for customers, due to the physical distance between the online seller and customers, as well as the temporal separation of payment and product delivery (Xiao and Benbasat, 2011). Such perceptions of risk sometimes cause customers to avoid online activities even though they may be safe (Dunn, 2004). This hinders the development of e-commerce. Through 2014, nearly half of all computer users in China have never purchased online. Therefore, it is important for companies to improve customers' online shopping experience, as well as potential customers' trust in shopping online.

Online sellers have long recognized these problems, and they have attempted to solve them by adjusting the sequence of payment and delivery; that is, offering different payment schemes to online customers. Currently, there are two types of online payment schemes in China which are the most widely used. One is pay-to-order, in which the payment occurs when an order is made. The other is pay-on-delivery, in which customers pay for products after delivery. Although pay-to-order is the most widely used because of its efficiency, pay-on-delivery is also very attractive because it improves the service quality by eliminating the worries regarding returns and refunds, as well as improving payment security. The pay-on-delivery service has been acting like a transition; it helps lead potential customers to shop online. Chiejina and Soremekun (2014) showed that pay-on-delivery will attract more customers, enable the processing of more orders and is more likely to succeed. Currently, in China, dual schemes (both pay-to-order and pay-on-delivery) are provided by many major electronic business platforms, such as JD.com, VIP.com, Dangdang.com, Amazon.cn and Paipai.com. Although Alibaba has its own payment scheme, Alipay, many online sellers on Taobao.com also offer dual payment scheme to attract customers, particularly those who distrust online shopping. Selling the product using the pay-on-delivery scheme expands the available market for online seller, but does have some additional costs associated with it. The associated cost of the online seller is higher in pay-on-delivery than in pay-to-order (Mangiaracina and Perego, 2009). Hence, certain critical questions

* Corresponding author.
E-mail addresses: xnlucky_2012@163.com (N. Xu), baishzh1962@126.com (S.-z. Bai), wan.207@osu.edu (X. Wan).

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emerge. How do different payment schemes affect online customers' behavior? Which is the better payment scheme for online seller, pay-to-order or dual scheme? How should the payment scheme be designed to obtain the optimal profit performance? What is the optimal strategy for the online seller in each payment scheme?

To address these questions, we develop a game theoretic model in which one online seller sells the product to online customers under two different payment scheme situations. One is pay-to-order; the other is a dual scheme. Such design is coincident with the practice of e-commerce in China. Different customers perceive differences between the two payment schemes, and they choose the one that maximizes their individual utility. By utilizing the rational equilibrium, we characterize the effect of a customer's behavior on the online seller's strategy. The optimal pricing and inventory decisions are obtained to help online sellers obtain the best performance under different payment schemes. We find that the customers want to pay less in a dual scheme than in pay-to-order, which is contrary to common sense. The comparison results of online seller's profit between pay-to-order and dual scheme mainly depend on the marginal revenue and the potential demand growth, which are also affected by the delivery time at certain situations. The shipping fee negatively affects online seller's profit in both kinds of payment schemes. In particularly, the negative effect is stronger in pay-to-order than in dual scheme, which helps to expand the application space of dual scheme in practice. For different types of products, online sellers should also offer different payment schemes. This study contributes to the literature by jointly considering payment scheme design and operation strategy in e-commerce.

The remainder of the paper is organized as follows. Section 2 introduces the background and related work of this study. Section 3 makes notations and the assumptions necessary to this paper. In Section 4, we establish our model under pay-to-order and dual scheme, respectively, and provide an equilibrium analysis. In Section 5, we conduct sensitivity analysis, and we conclude the paper in Section 6.

2. Literature review

Given its prevalence and importance, the payment scheme has been studied extensively. Research at the firm level has examined the effect of payment options on firms' inventory decisions (Chen et al., 2013; Song and Tong, 2011). Chen et al. (2013) analyzed three types of payment schemes and demonstrated that payment schemes affect newsvendor's inventory decisions. Trade credit, which allows buyers to delay payment by offering financing (Chern et al., 2013; Yang et al., 2012), was often utilized to encourage large orders (Giannetti et al., 2011). Researchers have also studied the effect of payment schemes on customer behavior. Researchers have found that, in reality, there is a preference for both prepayment and post-payment. Prelec and Loewenstein (1998) proposed a "double-entry" mental accounting approach to describe how the pleasure of consumption and the pain of planning interact to affect customers' behavior. The temporal distance between payment and consumption under prepayment provides the illusion that consumption is free for customers. Shafir and Thaler (2006) found that the typical wine connoisseur believes her initial purchase of a case of wine is an investment and later believes the wine is free when she drinks it; therefore, she moves through the entire process never experiencing the pain of payment.

Lee and Tsai (2014) conducted experiments to examine how price promotions influence postpurchase hedonic consumption experience. Zhao (2012) demonstrated that consumption enjoyment is actually reduced if there is a delayed payment after consumption. These researchers indicate that prepayment is much more welcomed by customers if consumption is one-shot, and the utility diminishes relatively quickly after consumption. However, there are certain customers who prefer payment after consumption. Prelec and Loewenstein (1998) examined this preference by using the time discounting theory, in which the cost of the product is depreciated during the period of usage. Hence, post-payment is better when the benefits of prepayment are less than the opposing influence of time discounting. Patrick and Park (2006) extended the research by considering the effect of product type on the preference for payment timing and reveal that solely hedonic-nondurable products elicit a preference for prepayment. However, no researchers have examined these issues in the context of e-commerce.

Following the emergence of Internet technologies, e-commerce has provided customers with alternative payment options while shopping online. Some of the literature focuses on the impact of payment schemes on customers' attitude towards shopping online. In general, payment types based on the Internet (pay-to-order) were more convenient than pay-on-delivery (Chong et al., 2011). However, certain researchers found that individuals were not willing to purchase online because they worried about the risk of payment through the Internet (Koyuncu and Bhattacharya, 2004). Although various security measures and mechanisms have been designed for the e-commerce payment systems, many security problems remain (Hsieh, 2001; Chou et al., 2004; Dai and Grundy, 2007; Kousaridas et al., 2008). For example, the transaction procedure in e-payment is different from that in the traditional payment solution, which may engender a range of new security issues, including concerns over unauthorized use and transaction status (Hwang et al., 2007; Lim, 2008). Kahneman and Tversky (1979) stated that a person is risk averse if he prefers the certain prospect (x) to any risky prospect with expected value x. Then, customers who perceive risk to online payment want to cease shopping online. Hence, there is a growing need to minimize the risks associated with e-payment transaction processes and develop customers' trust in payment online.

Kim et al. (2010) divide the influence factors of customers' perception of security and trust in e-payment systems into three levels: security statements, transaction procedures and technical protections. The researchers' findings show that both technical protections and security statements have a significant influence on improving customers' perceived security, which is positively related to customers' perceived trust; additionally, the perceived trust and security have a positive impact on e-payment system use. Certain research on the impact of potential risk on customers' trust in the mobile payment system (Chandra et al., 2010; Dan and Jing, 2011) indicated that such distrust would reduce the customers' intention to utilize a new payment system (Yang et al., 2012). Therefore, a better payment service is necessary for the development of e-commerce. In this paper, we introduce a pay-on-delivery scheme, which is similar to the traditional payment scheme and currently widely used by online customers in China. Pay-on-delivery is helpful to reduce the uncertainty during an online transaction. We believe pay-on-delivery has a transitional effect on the payment scheme shift from pay-on-delivery to pay-to-order with the growing confidence of customers. However, the importance of pay-on-delivery has seldom been examined in the literature.

A few researchers have observed the important meaning of different e-commerce payment schemes. Chiejina and Soremekun (2014) established the role of the 'Pay on Delivery' payment option in the recent prosperity of the Nigerian e-commerce sector as a major trust builder between customers and the online merchants, with the finding that pay-on-delivery is helpful to increase demand. The most relevant literature to our paper is Zhang and