The Competition Strategy of E-Retainers at a Duopoly Platform

By

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ABSTRACT

This paper investigates the competition and cooperation strategies of duopoly e-retailing platforms based on the two-sided market theory and the Hotelling model. We analyze the duopoly competition strategies between the duopoly e-retailing platforms under different seller costs, and how the consumer behaviors affect the firm's strategies, the finding shows that lower seller's selling cost makes the optimal admission fee and profit of the platform higher. Further, we study the strategy of e-Platform on investing innovation, the finding shows that e-Platform has more advantages by making the investment; meanwhile the optimal innovation level of the platform is just related with its innovative capability rather than the investment. The main contributions of this study includes (1)exploring the competition strategies of the e-retailing platforms from the view of the sellers' side, instead of the characteristics of the platforms; (2) approaching the findings by utilizing more complex and realistic model which is incorporated different consumer behaviors; (3) the study shows that the seller's selling cost and the consumer behavior strongly affect the profits of the e-retailing platforms; (4) the study also indicates that e-Platform has more advantages by investing innovation. These findings should be useful for the e-retailing platforms such as Tmall.com and Amazon.com.

KEY WORDS

Duopoly e-retailing platforms, Competition strategy, Two-sided market, Innovation investment, Marketing decision making.

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1. Introduction

Platform-based retailing is developing rapidly because of widespread applications of the e-commence such as Tmall.com, Amazon.com and JD. Com, however, the e-platforms are confronted with more and more drastic competitive environment. E-platforms can attract buyers and sellers to close deals in their platforms and get profits by charging trading fees and admission fees instead of price differences between purchasing and selling. Nowadays, more and more customers prefer to purchase on the platform, thus more and more sellers choose to enter the platform. Therefore, researchers increase interests to study related topics in this area.

The majority of the researchers study "platform" from the perspective of two-sided markets theory of industrial economics. Armstrong (2006) analyzed platform competition strategies in monopoly market and oligopoly market with both single platform and multiple platforms. Related literatures focused on two-part tariff strategy (Reisinger, 2014) and investment motivation of sellers (Belleflame and Peitz, 2010). Cao (2010) analyzed the impact on B2B platform strategies when multiple platforms join together. However, previous literatures focused on platform environment, market structure and two-side pricing mechanism but ignored the influence of sellers' operation performance in the platform on pricing strategies and profits of platform-based retailers. Actually, high operation cost makes many small sellers difficult to continue their business and it is significant to study how sellers' operation performance in the platform impacts on pricing strategies and profits of platform-based retailers.

In daily life, consumers' behaviors are various. Consumers only buy one in a period if it is expensive and lifelong product but two or more times if it is cheap daily necessities. Thus, we focus on platform-based retailer's competition strategies when consumer purchase on single platform in single period, on multiple platforms in single period and on single platform in multiple periods. In addition, we develop the model by adding the network externality between groups, the competition intensity of sellers and the difference between two platforms. In reality, platforms charge sellers admission fee and trading fee. Admission fee is that sellers pay fixed cost when they enter the platform for once per year (or other period time), for example, sellers have to pay technology support fee when they enter TMALL. Trading fee is that platform-based retailer gets part of revenue when seller closes a deal. In previous literatures, Reisinger (2014) studied two-part tariff of platform-based retailer. We assume that platforms just charge admission fee since we do not pay much attention to pricing mechanism, and this is very normal for small and new sellers at those worldwide largest e-platforms such as Taobao, Tmall and Amazon. Gabszewicz and Wauthy (2014) model competition between two vertically differentiated platforms—while Ribeiro et al. (2016) build on their framework. In these works a platform's quality is endogenous and is higher the larger the market share and the associated network externalities.

Considering above, we set a duopolistic competition model based on two-side market theory and the Hotelling model to analyze selling cost of sellers under the three scenarios of consumer purchase on single platform in single period, on multiple platforms in single period and on single platform in multiple periods. Further, we also study the strategy of e-Platform on investing innovation to figure how e-Platform can be benefited by making this kind of investment.

The rest of this paper is organized as follows. Section 2 reviews previous literatures. Section 3 describes our model setting up. Section 4 focuses on the factor of sellers operation cost with three customer behaviors. Section 5 is the managerial insights and conclusion. All proofs are relegated to the appendix.

2. Literature review

The rapidly developing e-retailing industry attracts more and more researchers' eyes (Ma et al., 2017; Vitor et al., 2017; Roger, 2017). Ansari et al. (2008) study the phenomenon that consumers transfer from traditional sales channel to online channel. Tsai and Hung suggest the importance of dynamic pricing and revenue management with uncertainty to e-retailing. Li and Tang (2011) investigate online dynamic pricing in DVD market. Huang et al. (2013) find that if the supplier chooses shorter lead time, another supplier would price lower in duopoly market when duopoly suppliers make e-retailing dynamic pricing and lead time decisions. Li et al. (2017) concentrate on the strong connection between local market and e-commerce platform. Other scholars also do many research about e-retailing and multiple channels exploiting (Huang et al., 2014; Mathew et al., 2015; Y.K.Cho, 2015;D. Herhausen et al., 2015; P.C. Verhoef et al., 2015; E. Pantano et al., 2015; L.Cao et al., 2015; M.Fassnacht et al., 2016; D. Grewal et al., 2016; P. Chatterjee et al., 2016).

Many previous researches investigate e-platform from the perspective of two-sided market. Caillaud and Jullien (2003) describe two-sided market using Intermediary markets theory. To explain two-sided market clearly, researchers define the condition and describe it from the perspective of price structure (J. Triole and Rochet, 2002, 2004). They suggest that consumer in the two-sided market is a necessary but not a sufficient condition to form two-sided market, which is the same with Coase theorem failure. They define two-sided market as on the condition of charging stable whole fee from two-sided consumers, varied fee charging from either side of consumer impacts on whole demand and volume of business in the platform. On the other hand, if whole demand and volume of business in the platform are just related to price but not the price structure, the platform is called one-sided market. However, they just consider the price structure but ignore the impacts of cross-group network externalities. Armstrong (2006) emphasizes the key of two-sided market is cross-group network externalities. He points out that in two-sided market, the utility of one side increases as the number of another side's consumers. Hagiu and Wright (2011) extend the conception of two-sided market to multiple-sided market. Li (2015) acknowledges that online media market does not belong to two-sided market. There are three types for two-sided market, involving market-makers, audience-makers and demand coordinators (Evans, 2003). Market-makers provide the consumers with sales platform. Audience-makers depend on the number of audience and the audiences on one side attract another side's users. Demand coordinators satisfy the demand of two-sided users, such as credit payment platform.

In addition to definition and classification, price strategy is also important to explore two-sided market, involving charge mode and price structure (Eisenmann et al., 2006; E.G.Weyl, 2008, 2010; Liu et al., 2013; M.Reisinger, 2014). Rochet and Triole (2002) develop the platform competition model initially to study the price structure of profiting platform and nonprofit platform. However, they do not take cross-group network externality into account. Armstrong (2006) extend their research by developing competition model based on cross-group network externality. Actually, Caillaud and Jullien (2003) have proposed price strategy and explained cross-group network externality by “chicken-and-egg problem”, but Armstrong clearly defines cross-group network externality and extends it. Lam et al. (2017) analyze the interaction of switching cost and network effects.

However, previous studies ignore the impacts of cross-group network externality on multiple e-platforms. This paper develop supply chain model with multiple suppliers and consumers to analysis the impacts of sales cost on platform competition strategy. We focus on platform-based retailer’s competition strategies when consumer purchase on single platform in single period, on multiple platforms in single period and on single platform in multiple periods.

3. Model

Consider two platform-based retailers $(i=1,2)$ compete in duopoly market. The platform-based retailer provides sellers and customers with an exchange platform and charges sellers the admission fee $F_i\,(i=1,2)$ to get profits. In particular, we assume that marginal cost and fixed cost of services that two platform-based retailers provide with sellers and customers are zero, which is suitable for the condition that the retailer’s marginal cost is equal to the fixed cost.

A consumer’s utilities associated with purchasing from platform retailer 1, platform retailer 2 and two platform retailers are given by

$$U_{b_1} = v + \alpha \tilde{n}_{s_1} - (p - \gamma n_{s_1}) - tx \qquad (1)$$

$$U_{b_2} = v + \alpha \tilde{n}_{s_2} - (p - \gamma n_{s_2}) - t(1-x) \qquad (2)$$

$$U_{b_{1,2}} = 2v + \alpha - (2p - \gamma) - t \qquad (3)$$

where $\tilde{n}_{s1}, \tilde{n}_{s2}$ are consumer’s expectations on network size of sellers joining platform retailer1 and platform retailer 2 respectively.

A seller’s utilities associated with joining platform retailer1 and platform retailer2 are given by

$$U_{s_1} = \alpha \tilde{n}_{b_1} + (p - \gamma n_{s_1} - c_1) n_{b_1} - F_1 + e \qquad (4)$$

$$U_{s_2} = \alpha \tilde{n}_{b_2} + (p - \gamma n_{s_2} - c_2) n_{b_2} - F_2 \qquad (5)$$

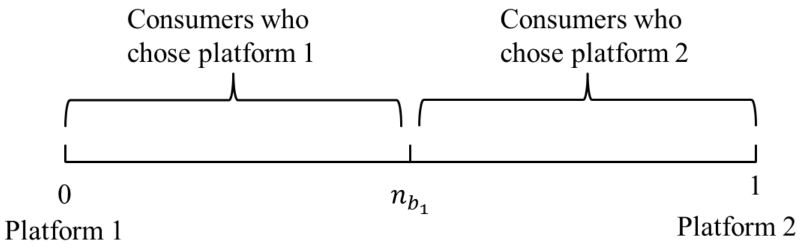
The profit functions of platform retailer 1 and platform retailer 2 are

$$\pi_1 = (F_1 - \frac{1}{2}ke^2)n_{s_1} \tag{6}$$

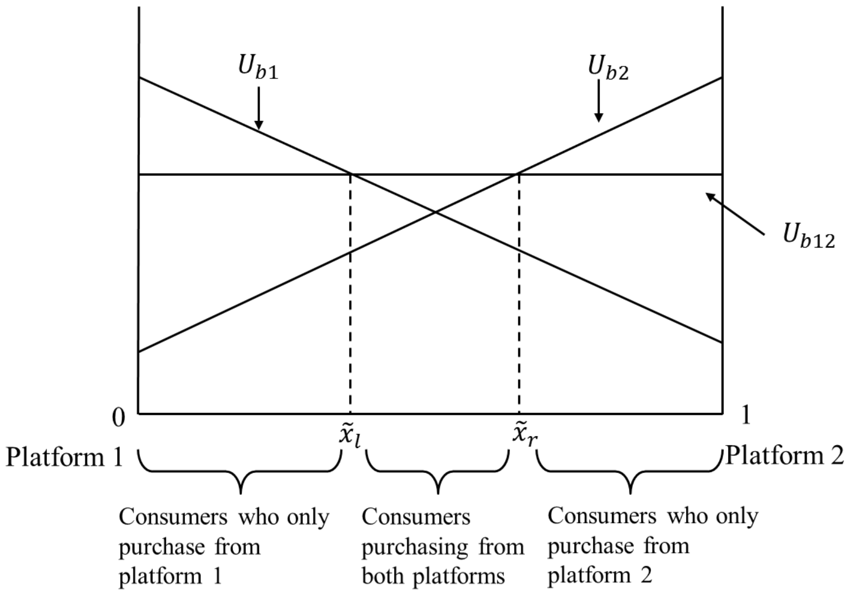
$$\pi_2 = F_2 n_{s_2} \tag{7}$$

One of the contributions of our study is to analyze competition strategy of duopolistic platform retailers from two perspectives: sellers' operation cost and platform retailers' innovation investment behavior on sellers.

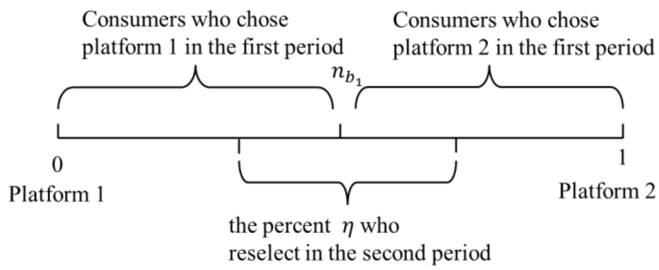
We consider market distribution of the three customer behaviors illustrated in Figure 1



(a) Consumers purchase from single platform



(b) Consumers purchase from multiple platforms in single period



(c) Consumers purchase from multiple platforms in the two periods

Figure 1 Market distribution of different purchase behavior

4. Competition strategies considering selling cost

In this section, we solve the Nash equilibrium for the three customer behaviors at first. Then, we explore the impact of seller' operation cost on duopoly platform-based retailer's optimal admission fees and optimal profits.

4.1 Single purchase from single platform
4.2 Single purchase from different platforms
4.3 Repeat purchase from single platform
4.4 Equilibrium Analysis

5. Conclusion

Using two-sided markets theory and Hotelling model to explore competition model of duopoly platform-based retailers under various sellers' selling costs and platform-based retailers' different innovation strategy, we have analyzed the model under different consumer behaviors, purchasing from single platform in single period, purchasing from multiple platforms in single period and purchasing from single platform in the two periods.

We show that, first, selling cost of sellers at the platform has impact on both the optimal pricing of duopoly platform-based retailers and the profits. Particularly, the lower is the seller's selling cost, the higher are the optimal admission fee and profits of the platform-based retailers, while consumer behavior has impact on the difference of the optimal pricing and the profits caused by seller's selling cost. Second, platform-based retailers who make innovation investment have more advantages than others in duopoly competition, the optimal pricing and profits of them are both higher than competitors. And the optimal innovation level of platform-based retailers stays the same under different consumer behavior, which is just related with innovative capability of platform-based retailers. Third, compared with purchasing from single platform in single period, consumer behavior purchasing from multiple platform in single period benefits for the competitive advantages of platform-based retailers whose sellers' selling cost are lower, but it has no influence on the competitive advantages of platform-based retailers who make innovation strategy. Forth, the consumer behavior purchasing from single platform in the two periods both make the competitive advantages (lower sellers' selling cost and innovation strategy) in the first period become more obvious in the second period.

This paper contributes to the theory which proving the impact of seller's selling cost and innovation strategy on platform-based retailer's competition strategy. It guides platform-based retailers to help sellers cut down their operation cost and better sellers' operation environment as well as improve themselves.

There are limitations of the model presented in this paper and future research may want to consider a number of extensions. First, explore about the consumer behavior purchasing from multiple platforms in the two periods. Second, explore the impact of internal competitive coefficient of sellers on duopoly competitive strategy.

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