A Stirring Effect of the Loss Leader Strategy in a Two-Sided Online Platform

Sunghan Ryu
Shanghai Jiao Tong University, shryu@sjtu.edu.cn

Kyungmin Choi
Opensurvey, kmc@business.kaist.edu

Daegon Cho
KAIST, daegon.cho@kaist.ac.kr

A Stirring Effect of the Loss Leader Strategy in a Two-Sided Online Platform

Short Paper

Sunghan Ryu
Shanghai Jiao Tong University
800 Dongchuan Road, Shanghai, 200240 China
shryu@sjtu.edu.cn

Kyungmin Choi
Opensurvey
5 Teheran-ro 20-gil, Gangnam-gu, Seoul, 06236 Korea
k.choi@idincu.com

Deagon Cho
KAIST Business School
85 Hoegi-ro, Dongdaemoon-gu, Seoul, 02455 Korea
daegon.cho@kaist.ac.kr

Abstract

Loss leader strategy refers to a pricing strategy in which sellers set much lower prices than the original ones for specific products to attract user attention. Similar to brick-and-mortar stores, online marketplaces often try to expose their platforms more visibly to potential buyers by offering a particular product at a lower price. Yet, the effects of the loss leader strategy on the online marketplaces is indeterminate and largely remains an empirical question due to distinguished characteristics of online marketplaces from the traditional retail setting. This study examines the effects of the loss leader strategy in the context of the two-sided online platform, focusing on the changes of both buying and selling sides after the introduction of loss leader. We collaborate with an online travel marketplace that introduced loss leaders (ticket products with lower price) to parts of sub-markets, providing a natural experimental setting for examining the effect of the loss leaders.

Keywords: Loss leader strategy; two-sided online platform; online marketplace; platform

Introduction

In a traditional retail setting, a "loss leader" refers to a pricing strategy in which sellers set much lower prices than the original ones for specific products to attract user attention (Hess and Gerstner 1987). Sellers expect that buyers will purchase other products while buying (or not buying) the loss leading products. While the effect of loss leading strategy on a store's profits is disputable, it has been widely agreed that the loss leader has a positive impact in terms of increased store traffic (Walters and MacKenzie 1988).

It is worth emphasizing that a considerable amount of economic activity has moved online in recent decades, and this transition seems to be more pronounced as a result of smartphones and mobile applications. Similar to brick-and-mortar stores (see Lewis (2006)), online marketplaces often try to expose their platforms more visibly to potential buyers by offering a particular product at a lower price. It is not special to see many online marketplaces adopt the loss leader strategy in various forms as the advent of online marketplaces has become prevalent in recent decades. As online marketplaces came to play an important role in facilitating transactions in many fields, it is necessary to understand the underlying mechanisms of economic behaviors, which may differ from those in a traditional setting. A strand of

information systems (IS) literature has focused on different dynamics of those online marketplaces, such as network externalities (Anderson Jr et al. 2013; Asvanund et al. 2004; Song et al. 2018), and competition (Bakos and Katsamakas 2008; Mantena and Saha 2012; Tiwana 2015). Surprisingly, however, it is not well known whether the loss leader strategy can bring real benefits to the online marketplaces. For example, a notable difference is that digital platforms can reduce the search and transaction costs of buyers; thus, they can switch to other products and services with a low burden. The original assumption behind the loss leading strategy is that buyers will be physically attracted to the retail store, and once inside the store, they will be triggered to purchase full-priced items. However, this mechanism may not be applicable to the online marketplace. Our study tackles this research gap for furthering the literature on online marketplaces, specifically with the two-sidedness i.e., two distinguished sets of user groups (Bakos and Katsamakas 2008; Lin et al. 2011; Mantena and Saha 2012; Parker and Van Alstyne 2005)

The loss leader strategy is expected to directly increase cross-selling opportunities, as proposed in Li et al. (2013). In addition to this direct effect on the existing buyers, it can be also leveraged to draw a sizable number of new buyers to the online marketplace, which may lead to a positive indirect network effect (Eisenmann et al. 2006; Song et al. 2018). When buyers are more willing to join an online marketplaces due to a set of attractive and lower-priced products, a greater number of sellers are also likely to participate on the platform in order to enjoy the network value on the buying side (Tucker and Zhang 2010). Despite the expected benefits of the buying side, however, one possibility is that buyers may purchase only a loss leading item on a focal website and browse other websites for other items. Also, when platform providers introduce loss leading products and services on the selling side, this strategy may hinder the economic incentive of sellers. Due to these possibilities, the effects of the loss leader strategy on the online marketplaces is indeterminate and largely remains an empirical question. More importantly, it is necessary to measure the mixed impact from the perspective of the platform provider for more effective strategies and managerial practices. Accordingly, this study examines the effects of the loss leader strategy in the context of the two-sided online platform (hereafter, TSOP). Our research focuses on the changes of both buying and selling sides after introducing the loss leader. More specifically, we tackle those questions: Does the introduction of loss leaders affect new entries of buyers and thus increase sales on a TSOP? Does the introduction of loss leaders lead to an increase of new sellers too? How do the sellers respond to the introduction of loss leaders?

We plan to examine the effects of the loss leader strategy leveraging a rich and unique dataset from an online travel marketplace connecting local tour guides (sellers) and travelers (buyers) so that travelers can experience a private tour guide with low search costs. As the marketplace planned to expand the buyer base, it introduced additional ticket products that can be useful for travelers – e.g., transportation passes or admission tickets for popular tourism sites. These ticket products are launched to an increasing number of destinations; thus, their prices are set to be relatively lower so as to attract new travelers by lowering the entry barrier. This context adequately provides a natural experimental setting for examining the effect of loss leaders in the TSOP.

Literature Review

The TSOP is a marketplace that enables direct transactions between two distinct types of formally affiliated customer groups, where both direct and indirect network externalities exist (Hagiu 2014). TSOP proposes a tool or technology for facilitating transactions between those groups (Eisenmann et al. 2006; Hagiu and Wright 2011); however, TSOP cannot control the transactions (Rochet and Tirole 2003; Rochet and Tirole 2006). The roles of each participant can be distinguishable at the point of the transaction (Hagiu and Wright 2011) while customer groups are formally affiliated to the TSOP. Finally, the size and quality of one side influence the users on both the same and the other side (Bakos and Katsamakas 2008; Evans and Schmalensee 2008; Evans 2003; Wright 2004).

With the advent of various TSOP services, such as the App store and eBay, and the advances of information systems, its importance and influence have increased. A strand of IS studies and strategy literature has attempted to understand the mechanism and the dynamics of the TSOPs. The mainstream of literature has focused on the economic aspect of TSOPs, including the price structure or policy issues (Armstrong 2007; Bakos and Katsamakas 2008; Eisenmann et al. 2006; Evans and Schmalensee 2008; Evans 2003; Lin et al. 2011; Parker and Van Alstyne 2005; Rochet and Tirole 2003; Rochet and Tirole 2006; Rysman 2009; Wright 2004). The strategy literature has attempted to explain how firm-level actions influence the growth

(and success) of TSOPs among competitors (Eisenmann et al. 2011; Fuentelsaz et al. 2015; Tellis et al. 2009). Considering the impact of network effects, a lead in drawing early users can preoccupy the market in favor of an early mover with an inferior product (Sheremata 2004). On the contrary, Eisenmann et al. (2011) found that new entrants with innovative products can successfully surpass dominant platforms, even when network effects are considerable. Relatedly, Tellis et al. (2009) argue that product quality is a critical success factor in such platforms, and that superior platforms tend to provide the highest quality of product over competitors. IS literature more focused on the online setting of TSOPs. Song et al, (2018) examine how cross-side network effects could be asymmetric in both short- and long-term, and how these effects are influenced by the TSOP's policies in the context of an Internet browser. In the video game context, Anderson at el. (2013) claimed that platform operators may perform better when decreasing investment in platform performance to provide greater content availability from the third party developers. The results indicate that greater investment in technology for products is not the only way to win the competition between platforms. In those markets where buyers are more interested in content diversity and availability, the key to success arises in promoted participants of third party developers. Relatedly, Ceccagnoli et al. (2012), in the context of software development, found that participating in a major platform ecosystem is positively associated with an performance of independent software vendors.

While these studies provide valuable insights into TSOPs, few studies have so far attempted to leverage the fact that there is heterogeneity in sellers and their products (Mcintyre and Srinivasan 2017). Although an emerging body of cases has supported the existence of indirect network effects and the mutually beneficial relationship between the buying and selling sides, it is not well known how platforms can strategically design and incentivize those indirect network effects that benefit the platforms. Finally, these studies have mainly adopted a static or cross-sectional analysis method, and have not examined how relationships among the sides of TSOPs evolve over time. For example, the effects of introducing new products on platforms in terms of altering those relationships have not been systematically examined. Thus, we expect further examination of specific platform strategies that foster the emergence and sustainability of platforms over time as an important next step in the literature. In order to fill this research gap, our study examines how the introduction of new products alters the dynamics of the platforms.

Theoretical Background and Hypotheses Development

As in a brick-and-mortar context (Blattberg et al. 1995; Hess and Gerstner 1987), price promotion is an useful communication tool for online marketplaces. Price promotions provide many benefits, such as product and brand awareness, all of which increase exposure to existing and new users and enhance product sales. Promotions can influence the buying patterns of buyers, which may affect the sales of regular-priced items (Walters and MacKenzie 1988). The bottom line idea of the loss leader strategy, i.e., upselling regular-priced items through the price promotion of a specific item, is to attract a substantial number of buyers by lowering the price of a particular product (sometimes even below its production costs), so that they may purchase other (profitable) items (Walters 1991). Specifically, a store can benefit from lowering the price of a popular products below its cost and then earning revenue from promoting impulsive buying (Hess and Gerstner 1987), as popular products will attract a number of potential buyers to visit the marketplace. Regarding this strategy, there is a well-addressed phenomenon that some products confront a huge price reduction during their peak demand (Chevalier et al. 2003). An earlier work found that the loss leader strategy had a positive influence on increasing traffic (Walters and MacKenzie 1988); subsequent studies confirm the significant effect of loss leaders on attracting buyers (Blattberg et al. 1995; Li et al. 2013).

Since one of the basic notions of TSOPs is that competition among platforms is driven by gathering users on two sides, one stream of literature has focused on examining how to draw those sides to the platform (Evans 2003; Parker and Van Alstyne 2005). Different pricing strategies are largely adopted by platform operators. The findings across the literature suggest that platform operators may subsidize one side of users, largely the buying side, by providing considerable discounts in order to attract the selling side to participate on the platform, leveraging a type of loss leader (Rochet and Tirole 2006; Rysman 2009). Those pricing decisions of platform operators may help them build large networks, and subsequently leverage the related positive feedback from existing buyers. Value to buyers may be enriched indirectly when they expect platforms with more sellers to provide a greater variety of products (Evans 2003). Potential buyers appreciate platforms with a larger number of other buyers in the same network with whom they can interact (Asvanund et al. 2004; Cennamo and Santalo 2013; Song et al. 2018). More importantly, we can assume those new entries of buyers are likely to provide additional cross-selling opportunities of the existing

products through high visibility from the loss leaders. This strategy is significantly similar with those in traditional offline retailers, who attract more buyers by offering loss leading products (Walters and MacKenzie 1988). Based on the argument, we propose Hypothesis 1:

Hypothesis 1.Introduction of loss leaders on a TSOP will have a positive effect on attracting more buyers.

Similarly, loss leader strategy may also have a significant effect on the selling side. Given that users on one side place a higher value on platforms with a larger number of other side users on the platform with whom they can transact, an increased number of buyers with the loss leader strategy would attract more sellers (Eisenmann et al. 2006). We expect that a platform's number of active buyers influences the choices of product sellers (Bonardi and Durand 2003; Eisenmann et al. 2011). The more the number of buyers on a platform, the more the incentive will be for sellers to introduce more products (Cusumano and Gawer 2003). For example, in the mobile application industry, choosing a platform with a large user base is more valuable to developers, as it offers a greater potential market for their applications, relative to platforms with smaller subsets of users. In tandem, these indirect network effects through a greater number of users can promote the emergence and sustainability of dominant platforms, and thus, provide strong competitive positions for the platforms. On the basis of these arguments, we suggest Hypothesis 2:

Hypothesis 2.Introduction of loss leaders on a TSOP will have a positive effect on attracting more sellers.

Given that introducing loss leaders consequently helps TSOPs attract more sellers, competition among sellers will be intensive because of increasing seller inflow (Tang 2006). Sellers should compete with the others for a limited pool of buyers on the platforms. Moreover, on online marketplaces, market transparency is high and search costs are low; thus, information of products can be collected and compared by potential buyers at a minimal cost (Brynjolfsson and Smith 2000; Schmitz and Latzer 2002). The high transparency and contestability of markets further enhance the intensity of competition among sellers. Seller competition on TSOPs is a critical agenda for platform operators, as it determines the sustainable growth and development of platforms. More specifically, competition among sellers would influence the dynamics of TSOPs in several aspects. Among others, regarding competition as a process of strategic decision making performed under uncertainty, the competition can be performed to promote the productive efforts of the sellers (McAfee and McMillan 1996). A seller competing with more competitors may take further actions over others in less competitive markets to satisfy potential buyers' needs better than its competitors (Day and Nedungadi 1994). Thus, we expect that higher market competition due to an increased number of sellers on a TSOP promotes extra activities of sellers (Lin et al. 2011; Tang 2006). Thus we propose:

Hypothesis 3.Introduction of loss leaders on a TSOP will promote extra activities of the sellers.

Empirical Setting and Data

To examine the hypotheses, we acquired data from one of leading online travel marketplaces in Korea. While early literature on TSOPs focused on traditional examples of online platforms such as Amazon and eBay , a recent stream of literature on different types of platforms has emerged., such as Internet browser (Song et al. 2018) and online dating (Bapna et al. 2016). Our study is within this burgeoning literature on TSOPs. Online travel marketplaces has recently received significant attention from IS domain, due to its important role in decreasing search cost and transaction cost in the travel industries. It is a suitable context to expand the scope of the literature.

This platform offers a wide selection of private local tours organized by the tour guides, i.e., assortments of tourist attractions for one or two days, – hereafter, *guided tour*s. Buyers can browse and purchases those guided tours via multiple channels including web browsers and a mobile application. Its main business activities consist of several steps as follows. First, the local guides design routes and itineraries for potential buyers. After that, they can post the tour guide packages to the marketplace. The marketplace displays a list of tour guides with its title, cover image, review summary, and price. Buyers can browse a particular guided tour to obtain further information regarding the guided tour, including introduction of the guide, detailed itineraries and duration, and review content. Different types of guided tours include sightseeing tour attractions, visit to popular local restaurants, and touring museums. Buyers can reserve the guided tours via the in-advance payment, and the travelers can communicate with the tour guide before the tour.

In addition to the guided tours, the TSOP launched another type of products, tickets and passes (e.g., transportation passes or admission tickets to popular visiting sites) in February 2015. They guaranteed the lowest rate of any tickets offered for attracting more new buyers to the platform. These special offerings can be regarded as loss leaders – hereafter, *tickets* to distinguish them from the focal items, guided tours. It is expected that the introduction of tickets would promote more buyers, given that buyers visited this marketplace via search engines or price comparison sites. As we can assume ticket buyers are travelers heading to a specific place, they are potential buyer of the guided tours offered in the same place. The marketplace looks for additional cross-selling opportunities of guided tours through high visibility from the loss leaders. This strategy is significantly similar with those in traditional offline retailers, who attract more customers by offering loss leading products. In addition, considering that the guided tours are designed slightly differently to meet customers' idiosyncratic traits, the customers may hardly find the same guided tours across different platforms. We conjecture that the customers have little possibility to prefer a certain platform, they rather seek for a local guide who will satisfy their specific needs. This serves as a favorable research setting for investigating the impact of the loss leader strategy in a TSOP. The observed differences in the platform will be more likely driven by an increase in traffic that the loss leader strategy raises.

Our dataset consists of the transactional data on sales, guided tour/ticket information, and reviews from the TSOP from April 2014 to August 2016. Our dataset contains 2,444 guided tours and 1,489 tickets in 262 different cities. During the research period, there exist 0.19 million active users, and half of them (0.1 million users) made 0.26 million reservations. Among the reservations, 58.3% are ticket reservations. In addition, we obtained the initial dates, sales, reviews and replies posted by travelers and tour guides of all guided tours and tickets during the period.

To examine the effect of introducing the loss leaders on new entries of both buyers and sellers, we aggregate the initial data in the combination of city and month to form a panel dataset. $TourSales_{it}$ is the total sales of guided tours in city i in month t. $TourCreated_{it}$ is the numbers of guided tours newly created in city i in month t. A key variable of interest is $D.LossLeader_{it}$, which has a value of one if any of the tickets are on the list with guided tours in city i in month t, and a value of zero otherwise. In addition, we exclude the cities having one or less reservations or having one or less guided tours, which results 3,007 city-month level observations with 126 cities.

We also constructed another dataset at a product level, in order to examine sellers' behavioral change. $SellerReviewNum_{ijt}$ denotes the number of tour guides' replies to customer reviews in the guided tour j of city i in month t. Note that this variable measures how much the tour guides devote themselves to the given tour items, which are proxies for sellers' extra activities. We create variables for the tenure of the guided tours ($TourTenure_{ijt}$), the average sales of the guided tours and tickets in the given city in the same period ($TicketSales_{it}$ and $TourSales_{it}$), and the number of customer reviews in the given guided tours $(CustomerReview_{ijt})$.

Initial Empirical Model

To examine how the introduction of loss leaders affects submarkets' sales, we utilize a difference-in-differences specification with the panel data on the basis of the city and month (Danaher et al. 2014). First, by comparing the average changes in sales of the control group cities (without tickets) and treatment group cities (with tickets), we verify that there exists a common trend in the sales between two groups:

$$TourSales_{it} = \beta_0 + \beta_1 \emptyset_t + \beta_2 \emptyset_t * TreatmentGroup_i + \mu_i + \varepsilon_{it}. \quad (1)$$

$$TourCreated_{it} = \beta_0 + \beta_1 \emptyset_t + \beta_2 \emptyset_t * TreatmentGroup_i + \mu_i + \varepsilon_{it}. \quad (2)$$

In Equation (1), the dependent variable is the number of guided tour reservations in city i in month t. $\emptyset_t$ is a vector of dichotomous variables for each month (i.e., time fixed effects). Here, we also introduce a variable ($TreatmentGroup_i$) that indicates whether a submarket of city i belongs to the treatment group (i.e., having ever included tickets during the research period). μ_i is the city fixed effects, and ε_{it} is an error term in the model. β_1 captures the time trend of tour sales in control cities, while β_2 measures how the sales in treatment cities differ from it. In Equation (2), the dependent variable is the number of new guided tours generated in city i with others specified identically with Equation (1).

Figure 1. Guided Tour Sales Trend

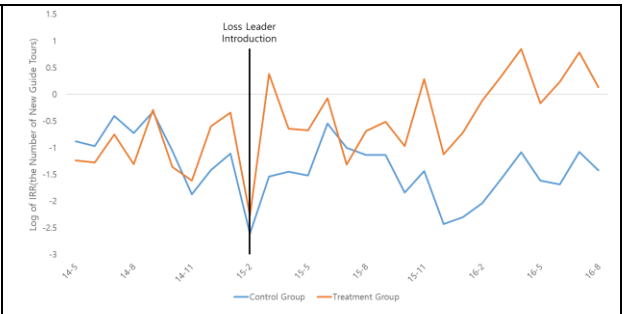

Figure 2. Inflow of New Guided Tours Trend

Surprisingly, the guided tour sales of treatment cities are growing faster than those of control cities. While, all the estimated β_2's are not statistically significant from April 2014 to November 2015, which implies that the tour sales of the two groups have a common trend before the loss leader strategy. However, from December 2015, all β_2's are statistically significant with p-values under 0.05, which indicates that there appear differences in the guided tour sales between treatment cities and control cities. It is also noteworthy that the guided tour sales of treatment cities become higher 10 months after the adoption of the loss leader strategy. This is because the loss leaders are not simultaneously introduced to all the treatment cities. Seeing Figure 2, the β_2s are statistically significant from January 2016. Similar to the results presented in Figure 1, new guided tours are created more in treatment cities after the loss leader strategy. Drawing on that there is a common trend in guided tour sales and the number of new guided tours, respectively, we adopt another version of difference-in-differences specification in order to measure the average treatment effect of the loss leader strategy across the control cities and treatment cities:

$$TourSales_{it} = \beta_0 + \beta_1 D.LossLeader_{it} + \theta_i + \mu_t + \varepsilon_{it}. \quad (3)$$

Here, the key variable of interest is $D.LossLeader_{it}$, and β_1 measures the impact of loss leader strategy on treatment cities compared to control cities. If this estimated coefficient is positive and significant, the platform's loss leader strategy has a positive impact on the sales of guided tours. To control for the time-invariant unobservable characteristics of each city, we include all city dummies (θ_i). These inherent attributes may include the popularity (which may not significantly change in the short run), geographic feature, size, population, and so on. We also include month fixed effects (μ_t) to control for unobservable time-specific factors that can affect all regional travel. To investigate how the introduction of loss leaders affects new entries of sellers, we transform Equation (3) by replacing the dependent variable.

$$TourCreated_{it} = \beta_0 + \beta_1 D.LossLeader_{it} + \theta_i + \mu_t + \varepsilon_{it}. \quad (4)$$

The dependent variable is now $TourCreated_{it}$ that account for the number of guided tours newly created in city i in month t. As in Equation (4), β_1 measures the effect of introducing loss leaders on the incentive of entrants to offer a new guided tour in the market.

Finally, to examine how the loss leader items affect the competition among sellers, we look at the review activities of sellers at the product level, as follows:

$$SellerReviewNum_{ijt} = \beta_0 + \beta_1 D.LossLeader_{it} + \beta_2 TourTenure_{ijt} + \beta_3 \log(TicketSales_{it}) + \beta_4 \log(TourSales_{it}) + \beta_5 \log(CustomerReview_{ijt}) + \theta_{ij} + \mu_t + \varepsilon_{ijt}. \quad (5)$$

The dependent variable of Equation (5) denotes the number of tour guides' replies to customer reviews in the guided tour j of city i in month t. Accordingly, β_1 measures the average effect of introducing loss leaders on the seller's efforts to communicate with customers. In this product-level analysis, we control for the tenure of the guided tours ($TourTenure_{ijt}$), the average sales of the guided tours and tickets in the given city in the same period ($\log(TicketSales_{it})$ and $\log(TourSales_{it})$), and the number of customer reviews in the given guided tours ($\log(CustomerReview_{ijt})$). Also, we include both the tour and month fixed effects (θ_{ij} and μ_t) to control for unobservable factors, as in the previous equations. The unobservable is captured in the error term (ε_{ijt}). To account for that all the dependent variables are over-dispersed count variables

(mean < variance), we adopt negative binomial regression for estimations (Cameron and Trivedi 2013). We fit the models using STATA version 14.2

Preliminary Findings

Table 1 shows the results of the coefficient estimation of Equation (3) and (4). The estimated coefficients of $D.LossLeader_{it}$ in column 1 is positive and significant, suggesting that introducing tickets increases the sales of the existing products. Loss leader strategy is associated with an increase in guided tour sales by 72.1%[1]. This notable growth of sales may be a consequence of more buyers, attracted by the loss leaders, which supports to accept Hypothesis 1. In column 2, the estimated coefficients of $D.LossLeader_{it}$ *of* Equation (3) are positive and significant, suggesting that introduction of tickets also incentivize the entry of sellers (tour guides). Loss leader strategy is associated with increased tour guide entry by 102.7%. Our empirical evidence suggests that the growth of new buyers from the introduction of loss leaders attracts more sellers. Thus, Hypothesis 2 is supported. Tables 2 shows the estimation results of Equation (5). In the table, the estimated coefficient of $D.LossLeader_{it}$ is not statistically significant. Introducing loss leaders does not increase the number of replies to customer reviews, implying that the loss leader strategy may not alter existing tour guides' behaviors. While additional participants join the platform led by the loss leading pricing strategy, most tour guides on the platform are not likely to react to the change aggressively. Thus, Hypothesis 3 is not supported. We can assume that the sellers might not notice the deepened competition caused by the loss leaders, as the influx of new sellers and their products could be invisible to individual sellers. Or those effects from the intensified competition would be realized with some time lags, as interactions among players on the platform evolve dynamically over time.

Table 1. Effects of Loss Leaders on Buying and Selling Sides

Variables	(1) DV: $TourSales_{it}$	(2) DV: $TourCreated_{it}$
$D.LossLeader_{it}$	0.5427***	0.7066***
	(0.0632)	(0.1165)
Constant	0.2864**	1.5135***
	(0.1288)	(0.1137)
City and Month Fixed Effects	Yes	Yes
Number of Observations	3,007	3,007
Number of Cities	126	126
LL	-4849.0566	-2221.5183

Note: Standard errors are reported in parentheses; *, **, and *** are equivalent to significance at the $p < 0.1$, $p < 0.05$, $p < 0.01$ levels, respectively. In column (1) 36 cities are excluded because they had no sales during the research period, and in column (2) only 27 cities are excluded because they didn't have new guided tours during the period.

Table 2. Effects of Loss Leaders on Seller Activities

Variables	DV: $\log(SellerReviewNum_{ijt})$
$D.LossLeader_{it}$	0.0411
	(0.0375)
$TourDuration_{ijt}$	-0.0186***
	(0.0052)
$\log(TicketSales_{it})$	0.0033
	(0.0098)
$\log(TourSales_{it})$	0.0900***

[1] The negative binomial regression models the dependent variables as the logarithm number of the expected count as a function of independent variables. Thus, to interpret the estimated coefficients, they need to be transformed into incident rate ratios (IRRs). We here report the IRRs.

	(0.0230)
$\log(CustomerReview_{it})$	0.0381
	(0.0254)
Constant	0.4507***
	(0.0984)
Tour and Month Fixed Effects	Yes
Number of Observations	4,894
Number of Cities	963
R-squared	0.0346

Note: Standard errors are reported in parentheses; *** is equivalent to significance at the $p < 0.1$, $p < 0.05$, $p < 0.01$ levels, respectively.

Future Works

For developing this research further, we plan to expand it in two aspects. First, different empirical approaches and models would be examined for confirming robustness of the results. While our current models are relatively straightforward, different empirical approaches can strongly support our arguments. Relatedly, potential bias may exist due to possible endogeneity issues, where introducing loss leaders can be associated with some unobservable factors. More salient aspects of loss leaders may be unearthed by considering endogeneity issues in the given setting. Thus, it should be resolved with the accredited instruments. Second, we will examine how the loss leader strategy influences user-level dynamics. For example, when platform providers introduce loss leading products on the selling side, this strategy may hinder the economic incentive of sellers. While loss leading products consequently may help TSOPs attract more sellers, given that competition among the extant sellers become more intensive because of a persistent seller inflow (Tang 2006). Sellers should compete with the others for an increased, but still limited pool of users on the platforms. Regarding these dynamics, future works can delve into how the unique characteristics of individual users moderate the interaction between the buying and selling side.

References

Anderson Jr, E. G., Parker, G. G., and Tan, B. 2013. "Platform Performance Investment in the Presence of Network Externalities," *Information Systems Research* (25:1), pp. 152-172.

Armstrong, M. 2007. "Two-Sided Markets: Economic Theory and Policy Implications," in *Recent Developments in Antitrust: Theory and Evidence,* J.P. Choi (ed.). MIT Press, pp. 39-59.

Asvanund, A., Clay, K., Krishnan, R., and Smith, M. D. 2004. "An Empirical Analysis of Network Externalities in Peer-to-Peer Music-Sharing Networks," *Information Systems Research* (15:2), pp. 155-174.

Bakos, Y., and Katsamakas, E. 2008. "Design and Ownership of Two-Sided Networks: Implications for Internet Platforms," *Journal of Management Information Systems* (25:2), pp. 171-202.

Bapna, R., Ramaprasad, J., Shmueli, G., and Umyarov, A. 2016. "One-Way Mirrors in Online Dating: A Randomized Field Experiment," *Management Science* (62:11), pp. 3100-3122.

Blattberg, R. C., Briesch, R., and Fox, E. J. 1995. "How Promotions Work," *Marketing Science* (14:3), pp. 122-132.

Bonardi, J., and Durand, R. 2003. "Managing Network Effects in High-Tech Markets," *Academy of Management Executive* (17:4), pp. 40-52.

Brynjolfsson, E., and Smith, M. D. 2000. "Frictionless Commerce? A Comparison of Internet and Conventional Retailers," *Management Science* (46:4), pp. 563-585.

Ceccagnoli, M., Forman, C., Huang, P., and Wu, D. 2012. "Cocreation of Value in a Platform Ecosystem: The Case of Enterprise Software," *MIS Quarterly* (36:1), pp. 263-290.

Cennamo, C., and Santalo, J. 2013. "Platform Competition: Strategic Trade-Offs in Platform Markets," *Strategic Management Journal* (34:11), pp. 1331-1350.

Chevalier, J. A., Kashyap, A. K., and Rossi, P. E. 2003. "Why Don't Prices Rise During Periods of Peak Demand? Evidence from Scanner Data," *The American Economic Review* (93:1), pp. 15-37.

Cusumano, M. A., and Gawer, A. 2003. "The Elements of Platform Leadership," *IEEE Engineering Management Review* (31:1), pp. 8-8.

Day, G. S., and Nedungadi, P. 1994. "Managerial Representations of Competitive Advantage," *Journal of Marketing* (58:2), pp. 31-44.
Eisenmann, T., Parker, G., and Alstyne, M. V. 2011. "Platform Envelopment," *Strategic Management Journal* (32:12), pp. 1270–1285.
Eisenmann, T., Parker, G., and Van Alstyne, M. W. 2006. "Strategies for Two-Sided Markets," *Harvard Business Review* (84:10), pp. 92-102.
Evans, D., and Schmalensee, R. 2008. "Markets with Two-Sided Platforms."
Evans, D. S. 2003. "Some Empirical Aspects of Multi-Sided Platform Industries," *Review of Network Economics* (2:3), pp. 191-209.
Fuentelsaz, L., Garrido, E., and Maicas, J. P. 2015. "Incumbents, Technological Change and Institutions: How the Value of Complementary Resources Varies across Markets," *Strategic Management Journal* (36:12), pp. 1778-1801.
Hagiu, A. 2014. "Strategic Decisions for Multisided Platforms," *MIT Sloan Management Review* (55:2), pp. 71-80.
Hagiu, A., and Wright, J. 2011. *Multi-Sided Platforms*. Harvard Business School.
Hess, J. D., and Gerstner, E. 1987. "Loss Leader Pricing and Rain Check Policy," *Marketing Science* (6:4), pp. 358-374.
Lewis, M. 2006. "Customer Acquisition Promotions and Customer Asset Value," *Journal of Marketing Research* (43:2), pp. 195-203.
Li, X., Gu, B., and Liu, H. 2013. "Price Dispersion and Loss-Leader Pricing: Evidence from the Online Book Industry," *Management Science* (59:6), pp. 1290-1308.
Lin, M., Li, S., and Whinston, A. B. 2011. "Innovation and Price Competition in a Two-Sided Market," *Journal of Management Information Systems* (28:2), pp. 171-202.
Mantena, R., and Saha, R. L. 2012. "Co-Opetition between Differentiated Platforms in Two-Sided Markets," *Journal of Management Information Systems* (29:2), pp. 109-140.
McAfee, R. P., and McMillan, J. 1996. "Competition and Game Theory," *Journal of Marketing Research* (33:3), pp. 263-267.
Mcintyre, D. P., and Srinivasan, A. 2017. "Networks, Platforms, and Strategy: Emerging Views and Next Steps," *Strategic Management Journal* (38), pp. 141-160.
Parker, G. G., and Van Alstyne, M. W. 2005. "Two-Sided Network Effects: A Theory of Information Product Design," *Management Science* (51:10), pp. 1494-1504.
Rochet, J. C., and Tirole, J. 2003. "Platform Competition in Two-Sided Markets," *Journal of the European Economic Association* (1:4), pp. 990-1029.
Rochet, J. C., and Tirole, J. 2006. "Two-Sided Markets: A Progress Report," *The RAND Journal of Economics* (37:3), pp. 645-667.
Rysman, M. 2009. "The Economics of Two-Sided Markets," *The Journal of Economic Perspectives* (23:3), pp. 125-143.
Schmitz, S. W., and Latzer, M. 2002. "Competition in B2c E-Commerce: Analytical Issues and Empirical Evidence," *Electronic Markets* (12:3), pp. 163-174.
Sheremata, W. A. 2004. "Competing through Innovation in Network Markets: Strategies for Challengers," *Academy of Management Review* (29:3), pp. 359-377.
Song, P., Xue, L., Rai, A., and Zhang, C. 2018. "The Ecosystem of Software Platform: A Study of Asymmetric Cross-Side Network Effects and Platform Governance," *MIS Quarterly* (42:1), pp. 121-142.
Tang, J. 2006. "Competition and Innovation Behaviour," *Research Policy* (35:1), pp. 68-82.
Tellis, G. J., Yin, E., and Niraj, R. 2009. "Does Quality Win? Network Effects Versus Quality in High-Tech Markets," *Journal of Marketing Research* (46:2), pp. 135-149.
Tiwana, A. 2015. "Evolutionary Competition in Platform Ecosystems," *Information Systems Research* (26:2), pp. 266-281.
Tucker, C., and Zhang, J. 2010. "Growing Two-Sided Networks by Advertising the User Base: A Field Experiment," *Marketing Science* (29:5), pp. 805-814.
Walters, R. G. 1991. "Assessing the Impact of Retail Price Promotions on Product Substitution, Complementary Purchase, and Interstore Sales Displacement," *Journal of Marketing* (55:2), pp. 17-28.
Walters, R. G., and MacKenzie, S. B. 1988. "A Structural Equations Analysis of the Impact of Price Promotions on Store Performance," *Journal of Marketing Research* (25:1), pp. 51-63.
Wright, J. 2004. "One-Sided Logic in Two-Sided Markets," *Review of Network Economics* (3:1), pp. 1-21.