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The moderating role of demand-side usage of O2O platforms and offline competition intensity for the outcome of proprietary platforms

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Abstract: Online to offline (O2O) platforms have risen in the digital era and have produced great impacts on local service providers. How online and offline attributes of local service firms influence the outcome of establishing proprietary platforms is understudied. The paper takes 528 cinemas in Nanjing from June 2017 to September 2017 as a sample. Based on network effects and the red queen theory, this paper focuses on the moderating effect of competition intensity and the demand-side usage of O2O platforms on the relationship between the choice of proprietary platforms and cinemas' performance. The findings show that competition intensity has a significantly positive moderating effect, while the demand-side usage of O2O platforms has a significantly negative moderating effect. Implications of the findings are discussed.

Keywords: competition intensity, platform usage, O2O platforms, proprietary platforms

1. INTRODUCTION

With the "Internet+" concept proposed and the continuous development of e-commerce, the online-to-offline (O2O) commerce has become increasingly popular and gradually penetrated the local service industry, including catering, travel and entertainment sectors. In the digital era, local service industries seize the opportunities of O2O commerce by joining third-party O2O platforms or establishing proprietaryO2O platforms. O2O commerce brings online customers to offline physical stores and improves the efficiency of physical stores. The process from online to offline is conducive for merchants to improve their products, cater to market demand and expand the size of users [1].

However, offline firms in O2O commerce differ from online firms in traditional B2C or C2C commerce in some aspects. The attributes of offline firms are very important in O2O commerce, among others, location selection. The location of an offline firm influences not only the competition intensity faced by the firm, but also spill over from geographical agglomeration [2]. Meanwhile, the O2O model is different from the traditional B2C and C2C model. O2O commerce emphasizes the organic interaction and fusion of online and offline components and highlights positive feedback between online and offline components. Existing literature on O2O commerce focuses on demand-side consumer groups or the nature of the offline business. Chintagunta and Pradeep (2010) study the effects of online user reviews on movie box office performance [3]. Dellarocas and Chrysanthos (2007) study the value of online product reviews for forecasting sales [4]. Song and Huang (2019) build a prediction model of movie box office revenue by empirically exploring its intricate relationships with different content published on different platforms [5]. Zhu and Zhang (2010) examine how product and consumer characteristics moderate the influence of online consumer reviews on product sales. Wan and Chen (2019) study the impact of the interaction between vertical integration and platform choice on the performance of offline firms [1]. The role of online and offline features of physical stores joining O2O platforms are understudied. Specifically, on the one hand the paper considers a physical store's online feature-its demand-side usage of O2O

platforms. Even if a physical store joins O2O platforms, some customers are likely to come from offline channels. The variable of demand-side usage of O2O platforms reflects demand side's engagement with the platforms. On the other hand, the paper takes into account an offline feature of a physical store-local competition intensity. Local stores face competition with rivalry firms, especially those neighboring ones.

The paper chooses China's movie theater industry as the research context. The industry has been reshaped by O2O platforms. In 2011, some online platforms in China launched group-buying service for movie tickets. Since then, the share of online sales has soared. In the second quarter of 2015, online ticketing accounted for 69.18% of the total box office revenues. With the advent of online platforms, the annual growth rate of the movie industry has exceeded 30%, far exceeding the growth rate of the country's GDP [6]. Furthermore, digital platforms play an important role in reshaping the industrial structure and changing the boundaries of the industry. O2O platforms, including third-party platforms and proprietary platforms, not only become the main channel for movie ticket sales, but also move into the stage of movie production and distribution by leveraging their advantages such as big data and IT capability. While O2O platforms rise in the movie theater industry, the influence of the competition intensity between the offline supply side is also very important.

The paper makes the following contribution. Firstly, it investigates the moderating effects of local competition intensity on the relationship between the choice of proprietary platform and firm performance. It helps understand the role of O2O platforms for offline firms that confront local competition. In this way, our research highlights and integrates offline features of firms joining digital platforms. Secondly, this paper examines the moderating role of the demand-side usage of O2O platforms on the relationship between the choice of proprietary platform and firm performance. It means that we incorporate the demand side into our empirical research, which is important as two-sided market platforms feature interaction between demand side and supply side. The interaction on O2O platforms may differ from the interaction on B2C or C2C platforms. In this way, this paper extends our understanding on platform-enabled two-sided interaction in the context of local markets.

2. THEORETICAL FRAMEWORK AND HYPOTHESES

The main effect of this paper is about the relationship between the choice of proprietary platforms and cinemas' performance. Literature has confirmed the positive impact of the relationship [7]. This paper focuses on two moderating effects. One is about the customers' usage of O2O platforms, which represents the online feature of the demand side. The other is about the competition between physical cinemas, which represents the offline attribute of the supply side.

2.1 Theoretical framework

2.1.1 The red queen effect

The red queen effect is based on the dialogue between the red queen and Alice in *Through the Looking Glass* by Lewis Carroll. Barnett applied this hypothesis to management & organization research and developed it into the red queen theory. Barnett (1996) proposes that the success or failure of organizational competition can be attributed to learning effect and screening effect [8].

The learning effect can be explained by the fact that, in a complex and rival business environment, the performance of a firm depends on whether or not it can outperform its competitors. The premise is that it needs to continuously learn to improve organizational vitality and performance, which is called organizational learning [9]. On the one hand, forced by fierce competition, a firm has to continue to learn and improve so as to keep up with its competitors. On the other hand, the learning ability of competitors is also stimulated and the competition becomes fiercer, thus continuing to initiate the process of the next round of search and learning.

The screening effect is similar to the evolutionary theory of survival of the fittest, which eliminates firms

with weak competitiveness. In the embarrassing situation of self-upgrading and co-evolution, only by maintaining strong competitiveness and passing the fierce selection can firms survive in the dynamic competitive environment. Screening can be explained by internal and external mechanisms [10]. The internal screening depends on the cognition and decision of the manager based on the actual situation. External screening is more influenced by the surrounding environment. The two mechanisms complement each other and work together.

2.1.2Network effects

E-commerce platforms feature network effects that facilitate interaction between same-side or cross-side customers. Network effects comprise of cross-side network effects and same-side network effects [11]. Same-side network effects, also known as direct network externalities, refer to that the utility of users in a network depends on the number of users on the same side. When the number of users using the same or compatible products increases, the utility of the products for users increases [12]. Cross-side network effects refer to the influence of users of one side of the market on users of the other side of the market. Specifically, the value of the platform to merchants (or consumers) depends largely on the number of consumers (or merchants).

2.2 Moderating effect

The proprietary platforms can help cinemas to streamline business process, improve the loyalty of users, expand the user base and thus improve the cinemas' performance. Meanwhile, attributes of offline firms such as the location of cinemas play an important role in moderating the main effect. According to the red queen theory, the competition among organizations can stimulate the learning effect. Proprietary platforms of cinema chains can provide various resources for affiliated cinemas, including a large installed base of customers, big data and business analytics capabilities. With platform-enabled resource and capabilities, cinemas can better understand and predict demands of consumers and improve their decision making such as movie scheduling. In this way, faced with higher competition intensity a cinema will be more motivated to improve its organizational learning by exploring knowledge from proprietary platforms. Such a cinema can give more play to the advantage of proprietary platforms, such as customer loyalty and streamlined business process. Meanwhile, the screening effect means that surviving cinemas are those that fit both the offline environment and the digital environment. The surviving cinemas can better handle offline competition by leveraging online platform resources. Therefore, we present the following hypothesis:

H1: The higher competition intensity faced by a cinema, the larger the impact of proprietary online platforms of a cinema chain on the performance of the cinema.

On one hand, the platform has cross-side network effects. The combination of proprietary platforms and offline physical stores can provide users with personalized value-added services and greatly improve consumer satisfaction and then continue to expand and consolidate user base. On the other hand, the platform has the same-side network effects. With the increase of the number of consumers on one side of the platform, more consumers will be attracted and the utility of users will be enhanced. The same-side and cross-side network effects can improve cinemas' performance.

In addition to the proprietary platforms, the choice of Internet platforms also includes joining the third-party platforms [7]. They refer to the Internet platforms that provide services for the two parties independent of the supply and demand sides of products or services, mainly including MaoYan, TaoPiaoPiao and Baidu Nuomi in the movie theater industry [7]. The types of firms on the proprietary platforms are generally the same and the number of them is limited. By contrast, the third-party platforms provide function repertoires, including transaction matching, online communities and value-added services. Therefore, third-party digital platforms have a larger installed base of customers than proprietary platforms. Because third-party digital platforms account for a majority of demand-side users, the higher the demand-side usage of digital platforms,

the stronger the network effects brought by third-party platforms and the weaker the network effects brought by proprietary platforms. The weaker the network effects brought by proprietary platforms of cinema chains, the lower performance affiliated cinemas can achieve. In sum, we present the following hypothesis:

H2: When the demand-side usage of digital platforms is higher, the relationship between the choice of proprietary platforms of cinema chains and the performance of affiliated cinemas becomes weaker.

3. METHODOLOGY

3.1 Data

This paper treats cinemas as the unit of analysis and uses a panel-data model. The sample covers cinemas in six major urban districts of Nanjing with the sampling period from June 2017 to September 2017. We adopt a week as the time interval as movies are generally released weekly. The year of 2017 was chosen because according to statistics from the China Report Network, online ticketing accounted for 83.9% market share of the movie theater industry in China's first-tier cities in 2017, 83.5% market share in the country's second-tier cities, and 81.3% and 77.5% market share in the country's third and fourth-tier cities respectively [13]. It shows that O2O platforms have become the main outlet for ticket sales in China's movie theater industry. The O2O commerce is gradually maturing in the movie theater industry. In this paper, we choose June to September as the sampling period because it includes the summer holiday, which is one of golden periods for movie exhibition. We choose the six major urban districts because the six major urban districts have superior geographical locations and advantages over the other five suburban districts in terms of population density, economic, development, and culture consumption. Data are collected from Entgroup database, a professional database about China's motion picture industry.

3.2 Variables

(1) Dependent variable. In this article we use cinema's performance Rev_i as the dependent variable, which is measured by the cinemas' box-office revenues. In china, box-office revenues are the main source of income for theaters. Therefore, it is reasonable to regard it as the cinemas' performance.

(2) Independent variable. $Selfplat_i$ captures the number of self-established platforms of the cinema chain. So far, there have been three types of proprietary platforms for cinemas, i.e., a web page platform with online ticketing function, a mobile terminal platform in the form of App and a public account platform embedded in WeChat App. Based on the collected data of proprietary platforms of every cinema chain, this paper assigns 3 to the cinema chain with three types of self-established platforms, 2 to the cinema chain with two types, 1 to the cinema chain with one type, and 0 to the cinema chain without any proprietary platform.

(3) Moderating variable. There are two moderating variables, $Cominten_i$ and $Onratio_i$. $Cominten_i$ represents competition intensity faced by a focal cinema. The variable is measured by the following formula:

$$Cominten_i = \sum_{\substack{j=1 \\ j \neq i}} \frac{1}{Dc_ic_j}(Dc_ic_j \leq 5km)$$

Where Dc_ic_j represents the distance between Cinema C_i and Cinema C_j

Using a program called Anaconda, we can measure the distance between any pair of cinemas. The more neighboring cinemas a cinema has, the higher competition intensity the cinema confronts. The inverse of distance between a pair of cinemas represents their competition intensity. By adding all the inverses regarding a focal cinema together, we can get the measure of competition intensity for the focal cinema. We set the upper bound of cinema distance as 5 kilometers [2]. In robustness check, we will change the upper bound from 5 kilometers to 3 kilometers.

The moderating variable $Onratio_i$ represents the utilization rate of O2O platforms on the demand side. This

variable is measured by the proportion of box office revenue realized through the online sales channels in the total box office, reflecting the frequency of demand-side usage of O2O platforms.

(4) Control variables. This paper includes four control variables, i.e. $Seat_i$, $Screen_i$, $Price_i$ and $Density_i$. Control variables capture the characteristics of the cinemas. $Seat_i$ represents the capacity of a cinema to accommodate customers, measured by the total number of seats of the cinema. $Price_i$ reflects the market power of a cinema, measured by the average price set by the cinema in the sample week. $Screens_i$ represents the capacity of a cinema to exhibit films simultaneously, measured by the total number of screens of the cinema. The variable $Density_i$ is measured by the population density of the administrative district where a movie theatre is located. We adopted the data of the residential population in each district at the end of 2017 from Nanjing Municipal Annual Statistics. The variable is calculated by dividing the data by the area of the corresponding district. Density determines the potential scale of a cinema's audience and may influence the cinema's decisions.

4. RESULTS

4.1 Descriptive statistics

To keep the sequence stable, we take the logarithm of the variable Rev_i and $Seat_i$. Table 1 gives descriptive statistics of variables and their correlations. For all variables, the standard deviations are smaller than their mean value. Variance inflation factor(VIF) was used to check whether the variables have the potential problems of multicollinearity. Results show that the mean value of VIF is 1.81 and the maximum value of VIF is 2.8. Consequently, the potential possibility of multicollinearity could be excluded.

Table 1.   Descriptive statistics and correlations

Variables	Mean	SD	VIF	Rev	Selfplat	Onratio	Cominten	Seat	Screen	Price	Density
Rev	11.98	1.337		1.000							
Selfplat	1.23	1.097	2.8	0.117***	1.000						
Onratio	85.99	15.698	2.45	0.439***	-0.167***	1.000					
Cominten	4.97	3.672	2.11	0.178***	0.211***	0.114***	1.000				
Seat	6.76	0.685	1.63	0.813***	0.123***	0.266***	0.128***	1.000			
Screen	7.90	2.868	1.24	0.674***	0.194***	0.151***	0.426***	0.662***	1.000		
Price	31.02	4.202	1.23	0.479***	0.259***	0.018	0.098**	0.238***	0.389***	1.000	
Density	0.76	0.601	1.22	-0.009	0.050	0.051	0.600***	-0.009	0.117***	-0.124***	1.000

Note: *** $p<0.01$, ** $p<0.05$, * $p<0.1$

4.2 Regression results

Table 2 gives regression results. Model 1 is a baseline model, including all control variables. Model 2 adds the independent variables $Selfplat_i$ based on Model 1. Model 3 includes moderators $Onratio_i$ and $Cominten_i$. Model 4 includes interaction terms between the independent variables and moderators.

The result of Model 2 reveals that $Selfplat_i$ has a significant and positive impact on the cinemas' operating performance. According to the results of Model 4, the coefficient of the interaction terms $Selfplat_i*Onratio_i$ is negative and significant, thus supporting H2. It demonstrates that the higher the proportion of online box office revenues, the weaker the impact of the number of proprietary platforms on the performance of affiliated cinemas. The coefficient of the interaction term $Selfplat_i*Cominten_i$ is positive and significant, thus H1 is supported. The stronger the competition intensity between offline cinemas, the stronger the impact of the number of cinema chains' proprietary platforms on the performance of affiliated cinemas.

Table 2.   Regression result

	Model 1	Model 2	Model 3	Model 4
Screen	0.057***	0.053***	0.071***	0.080***
	(0.006)	(0.007)	(0.004)	(0.005)
Seat	1.553***	1.582***	1.337***	1.323***
	(0.024)	(0.029)	(0.037)	(0.042)
Price	0.084***	0.088***	0.086***	0.083***
	(0.002)	(0.002)	(0.002)	(0.002)
Density	-0.104***	-0.106***	-0.013	0.033
	(0.017)	(0.022)	(0.020)	(0.022)
Selfplat		-0.070***	0.004	0.720***
		(0.006)	(0.008)	(0.132)
Onratio			0.019***	0.035***
			(0.001)	(0.003)
Cominten			-0.020***	-0.041***
			(0.004)	(0.005)
Selfplat*Onratio				-0.009***
				(0.001)
Selfplat*Cominten				0.010***
				(0.003)
_cons	-1.554***	-1.771***	-1.881***	-3.113***
	(0.142)	(0.161)	(0.181)	(0.312)
N	528	528	528	528

5. DISCUSSION AND CONCLUSIONS

The paper explores the moderating effects of the demand-side usage of O2O platforms and offline competition intensity on the relationship between the number of proprietary platforms and cinemas' performance. The findings show that competition intensity has a significantly positive moderating effect, while the demand-side usage of O2O platforms has a significantly negative moderating effect.

Offline competition intensity positively moderates the main effect, indicating that there is a complementary relationship between offline competition intensity and multiple proprietary online platforms. The emergence of online platforms has changed the pattern and situation of offline competition. As O2O platforms rise in Chinese economy, cinemas have built their own or joined third-party O2O platforms. Intensified offline competition urges movie theaters to leverage platform resources and capabilities, including a large user base and big data. With the platform resources and capabilities, offline cinemas can improve movie marketing, and develop a positive feedback between online customer behavior and comments and offline consumption.

The demand-side usage of O2O platforms negatively moderates the main effect. The final results do not support the complementary relationship between demand-side usage of O2O platforms and the choice of proprietary platforms, indicating that the influence of proprietary platforms is limited. In contrast, the third-party platforms are more influential in China's O2O commerce. When a cinema decides to join third-party platforms or to establish proprietary platforms, it needs to make a careful decision based on its own reality and the characteristics of the external environment. For small-scale firms, if they cannot accumulate enough users to achieve the critical mass for igniting network effects, it is a better choice for them to join third-party platforms.

There are some limitations of this paper, which give directions for future research. First, the paper takes

528 cinemas in six major urban districts of Nanjing from June to September in 2017 as samples. Future research can examine our research question with a sample of a longer time horizon and from different cities. Second, we investigate our research question in the context of China's movie theater industry. To generalize the conclusion of our paper, the hypotheses can be tested in the context of other local service sectors in more countries. Third, future research can further dig into the quadratic effect of the moderating term, instead of the simple linear relationship. There may be more interesting discoveries. Fourth, we examined the moderating impacts on the relationship between the choice of proprietary platforms and cinemas' performance. When O2O platforms rise in the local service industry, they can empower participating firms to improve their decision making. It heralds a future direction about the moderating impact on the relationship between participating firms' decision making and their performance.

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REFERENCE

[1] X. Wan and J. Chen. The relationship between platform choice and supplier's efficiency-evidence from China's online to offline (O2O) e-commerce platforms[J]. Electronic Markets, 2019, 2:153-166.

[2] D. C. Chisholm and G. Norman. Spatial competition and market share: An application to motion pictures[J]. Journal of Cultural Economics, 2012, 3:207-225.

[3] P. K. Chintagunta, S. Gopinath and S. Venkataraman. The effects of online user reviews on movie box office performance: Accounting for sequential rollout and aggregation across local markets[J]. Marketing Science, 2010, 5:944-957.

[4] C. Dellarocas, X. M. Zhang and N. F. Awad. Exploring the value of online product reviews in forecasting sales: The case of motion pictures[J]. Journal of Interactive marketing, 2007, 4:23-45.

[5] T. Song, J. Huang, Y. Tan and Y. Yu. Using User-and Marketer-Generated Content for Box Office Revenue Prediction: Differences Between Microblogging and Third-Party Platforms[J]. Information Systems Research, 2019, 1:191-203.

[6] Y. Cui, J. Mou, J. Cohen and Y. Liu. Understanding information system success model and valence framework in sellers' acceptance of cross-border e-commerce: a sequential multi-method approach[J]. Electronic Commerce Research, 2019, 1-30.

[7] X. Wan and J. Yang, Internet platform choice, vertical integration and firm performance. China Industrial Economics, 2017(7): p. 156-174.

[8] W. P. Barnett and M. T. Hansen. The red queen in organizational evolution[J]. Strategic management journal, 1996, S1:139-157.

[9] J. G. March. Exploration and exploitation in organizational learning[J]. Organization science, 1991, 1:71-87.

[10] A. D. Henderson and I. Stern. Selection-based learning: The coevolution of internal and external selection in high-velocity environments[J]. Administrative Science Quarterly, 2004, 1:39-75.

[11] M. W. Van Alstyne, G. G. Parker and S. P. Choudary. Pipelines, platforms, and the new rules of strategy[J]. Harvard business review, 2016, 4:54-62.

[12] C. Cennamo and J. Santalo. Platform competition: Strategic trade‐offs in platform markets[J]. Strategic management journal, 2013, 11:1331-1350.

[13] A. Lau, J. Chi, F. Gong, L. Li and N. Liao. China's iConsumer 2015: A growing appetite for choice and change[J].McKinsey&Company(http://www.mckinseychina.com/chinasiconsumer-2015-a-growing-appetite-for-change/), 2015.