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Short Paper

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Abstract

Live streaming is adopted by many digital and e-commerce platforms. As a popular way for people to obtain information products and entertainment, live streaming generates tremendous business revenue through pay-as-you-wish gifting (PAYW). As one of the most important channels to earn profits by live streaming hosts, PAYW faces the trouble of free riders who watch live content without payment. To encourage free-rider audiences to pay, some platforms in China have introduced a lottery mechanism, which allows people to get high-value prizes by paying a threshold price. We conduct a quasi-experiment with lottery block on a popular live streaming platform to estimate its causal effect on PAYW gifting. The study identifies heterogeneous effects based on user opportunism and impulsive tendencies. The proposed typology of lottery provides a framework for improving PAYW gifting in live streaming e-commerce.

Keywords: Live Streaming, Lottery, PAYW, User Behavior

Introduction

Live streaming as an emerging industry has become an increasingly popular information source as it provides new functions that facilitate user engagement, including interactive texts (danmaku), pay-as-you-wish gifts, and lottery. Pay-as-you-wish (PAYW), a new pricing method for information products, was adopted by a large number of sellers in live streaming markets (Chen et al., 2017; Kim et al., 2009; Schmidt et al., 2015). PAYW is a participative pricing strategy in which buyers are allowed to pay any intended price for a product or service, including zero (Kim et al., 2009). Compared with traditional seller pricing, such as fixed pricing, subscription, auction, and pay-per-use (Balasubramanian et al., 2015; Eisenmann et al., 2006; Gurnani and Karlapalem, 2001; Jain and Kannan, 2002; Postmus et al., 2009; Varian, 2000), PAYW is a way to motivate sellers to provide high-quality products and give consumers freedom of pricing choices (Groening and Mills, 2017).

Notably, PAYW gifts have become one of the primary revenue sources for live streaming hosts (Lu et al., 2021). This pricing strategy was implemented on many platforms, and prominent live streaming platforms, such as YouTube Live, fully embraced the PAYW strategy. According to a report,[1] live streaming hosts within the United States received $129 million in the form of tips in 2017, and the report predicts that the "tipping market" will reach $372 million in 2022. Unlike offline market transactions, online users are less constrained to pay for information products in the virtual world (Chen et al., 2017). PAYW gifts, as one of

[1] https://medium.com/hackernoon/esports-the-tipping-market-129-000-000-in-tips-to-streamers-paid-in-2017-2cd7248ee623

the primary revenue sources for live streaming hosts, face a big problem of *free riders*: few audiences are willing to PAYW, and there are numerous free riders who may just watch live broadcasts without payment.

To encourage free-rider audiences to pay gifts, some leading platforms in China have introduced a lottery mechanism: hosts can initiate a lottery with a high-value prize as a hook and set a much lower threshold, thus attracting more audiences to PAYW. For example, the host can provide a prize worth $2,000, and audiences only need to pay $1 to participate in the lottery. The lottery setting motivates the audience to give some small virtual gifts (which satisfy the lowest threshold set by a host) to win prizes. On the one hand, lottery can attract more people to participate in PAYW gifting, thus increasing hosts' popularity and revenue. On the other hand, hosts may face financial risks: if there are few participants, hosts may suffer a financial loss due to high-value prizes. For example, in a lottery with a $1 threshold and $2,000 prize value, if there are only 1,000 participants, the host will lose $1,000 in lottery.

In this study, we leverage a quasi-experiment setting to identify the causal effect of lottery on PAYW gifts. We take advantage of an unexpected, temporary block of the lottery function on a popular live streaming platform as an exogenous shock. Since there is limited evidence on how lottery affects PAYW gifting as a major source of platform revenue, the study examines two research questions: (1) Does the adoption of lottery increase or decrease a host's PAYW gifts? (2) What kind of lottery strategy can strengthen the lottery effect on hosts' PAYW revenue? Our results show that blocking of lottery hurts the PAYW revenue while the adoption of lottery boosts the PAYW revenue. Moreover, we find that the threshold may exert a moderative effect on the lottery function: a higher participation threshold strengthens the effect of lottery block on PAYW revenue. Our study theoretically contributes to three streams of literature—live streaming, lottery, and PAYW. From a practical standpoint, our study informs hosts on how to choose lottery strategies to attract more PAYW gifts.

Literature Review

Live streaming applications have become an essential tool in people's daily lives for online entertainment, shopping, conferences, and education (Xue et al., 2020; Zhou et al., 2019), especially during the COVID-19 pandemic. There are three roles in entertainment-oriented live streaming platforms: audience, hosts, and platform operators. Some current studies focus on factors that influence continuous consumption during live shopping, such as emotions and social interactions (Bharadwaj et al., 2022; Chen and Lin, 2018; Lin et al., 2021). For example, a happier broadcaster makes the audience happier and begets intensified viewer activities (Lin et al., 2021).

As one of the primary revenue sources for hosts on live streaming platforms (Lu et al., 2021), PAYW becomes another dominant stream in the field of live streaming. PAYW is a participative strategy in which audiences are allowed to pay any intended price for a product or service to hosts on the live streaming platform, including zero (Kim et al., 2022). Traditional PAYW allows buyers more flexibility of choice in price and encourages vendors to offer high-quality goods (Groening and Mills, 2017). However, PAYW strategy faces a *free-rider* dilemma on live streaming platforms: there are many free riders who may just watch live broadcasts without any payments, and only few audiences are willing to PAYW. Existing studies find that PAYW gifting behavior is influenced by danmaku (Zhou et al., 2019), audience size (Lu et al., 2021), emotion (Lin et al., 2021), cumulative spending in the past (Ma et al., 2022), or viewer satisfaction (Liu et al., 2022). However, there is limited evidence on the effect of lottery on PAYW.

Online lotteries are different from traditional lotteries in terms of format and participation experience (distance, scale, skills, interaction, etc.), as well as lottery parameters (duration, etc.). For traditional lottery, people pay threshold prices to win a probabilistic uncertain prize, and the most popular formats include the numbers game, lotto, and scratch card (Ariyabuddhiphongs, 2011). It is often held by professional lottery companies and organizations. Also in the traditional setting, people need to participate in person to choose lottery options; thus, the scale of traditional lottery is limited by geography, implying that offline traditional lottery attracts people near the neighborhood. In contrast, online lottery is utilized to promote sales as an auxiliary tool for business across over the Internet. In the online context, people can participate in lottery through the Internet without geographical limit, which makes the lottery scale larger than that in the traditional context. Moreover, online lottery is often held by e-marketers, sellers, and individuals, providing better interactive experience for participants and hosts. In terms of lottery-related parameters, the duration

of an online lottery is relatively shorter than the traditional ones because the latter needs a longer time to attract more people to walk in and participate.

Existing IS research has studied online lottery in the crowdfunding context (Du et al., 2019; Gong et al., 2021; Wei et al., 2021), under which fundraisers can start a one-shot lottery with rewards of money/goods to attract backers. Lottery is found to be more attractive to people who are opportunistic and risk-tolerant, or derive pleasure from uncertainty (Gong et al., 2021). There is a strong opportunism in lottery because people have a low payout ratio even though there is a low probability of winning (Ariyabuddhiphongs, 2011).

However, lottery on live streaming platforms (1) lasts a shorter time (i.e., 60 seconds), (2) allows hosts to interact with participant along the way, and (3) can be hosted several times in a day. Lottery is held by live broadcasters in a much shorter expiration time window, with higher frequency and participation convenience that may enlarge user opportunism. Moreover, some point out that participation threshold and the number of winners have an impact on lottery performance (Kong et al., 2020). On live streaming platforms, the effect of crowd size and past winners may be amplified because hosts can interact with audiences with audio, video, and texts. These interactions can help broadcast the lottery features at higher frequency and attract more audience participation. So far, there is limited investigation into the role of lottery in PAYW, on which we develop hypotheses in the live streaming context.

Hypothesis Development

Lottery is a popular uncertainty reward mechanism for risk tolerance that accompanies hedonic benefits (Chandon et al., 2000; Gneezy et al., 2006; Iyengar et al., 2008). In the live streaming context, we hypothesize the adoption of lottery can increase the performance of PAYW gifting. First, lottery can promote audience participation in the live streaming context, as the audience can participate at a low cost that promotes their PAYW gifts (Lin et al., 2021). For jackpot winners, winning the prize can motivate them to gift more in return. Second, lottery brings hedonic enjoyment and social interactivity to the audience. During lottery, the host and the audience have a common topic about the lottery, which shortens their psychological distance. The improved interactivity can produce a shared sense of community, thus facilitating audience engagement (Mollen and Wilson, 2010). Third, lottery increases the popularity of a focal live room, making the platform recommend the room to more audiences outside. This increases the audience size and helps the host generate more PAYW revenue (Lu et al., 2021). In contrast, block of the lottery function may hurt PAYW revenue from user interaction, happiness, and audience size during the lottery. These considerations lead to the following hypotheses:

H1a: Lottery block by the live streaming platform decreases the total value of PAYW gifts.

H1b: Lottery adoption by the live streaming platform increases the total value of PAYW gifts.

Moreover, lottery participation is associated with impulsive tendency, which is a sudden and persistent urge to do something immediately (Rook, 1987). The impulsive behavior is typically unplanned and unexpected, but compelling and hedonically complex in purchasing behavior. Past literature has found that online interactivity and affective stimuli (e.g., arousal or pleasure) can strengthen the impulsive tendency in the audience, when combined with product scarcity and promotion (Zhao et al., 2021). The argument of impulsive tendency can be extended to the live streaming context, in which the effect of lottery is still unknown but may incorporate these factors.

Specifically, the threshold of lottery participation may affect audience impulsivity, and this important parameter is directly determined by the hosts. On the one hand, a high threshold implies a high prize value and scarcity, which can be a strong stimulus for the audience's impulsive tendency in gift-giving. As one of the marketing principles, scarcity can arouse the urgency of consumers, thus motivating them to make more purchases (Aggarwal et al., 2011). The higher value and scarcity of the prize provide a stronger tendency for the audience's impulsive gifting. Those who participate despite high threshold may have higher willingness-to-pay, thereby generating more gifts to hosts. Moreover, participants with low willingness to participate may be filtered out due to the high threshold. Therefore, we propose the following hypothesis:

H2: Lottery prize with a high threshold can strengthen the effect of lottery on the value of PAYW gifts.

Data and Identification Strategy

Data

We collect data from a popular entertainment-oriented live streaming platform in China. During our observation period, the platform blocks the lottery function due to the outbreak of COVID-19. During these 20 blocking days, all other functions, such as live broadcasting, sending danmuku, and rewarding gifts, are retained except for lottery. Using the lottery data and the daily performance data of 3,066 rooms from November 2019 to March 2020, we conduct a quasi-natural experiment to identify the impact of lottery on PAYW revenue. In the dataset, it contains three periods: period 1 - the pre-shutdown period (from Nov 2019 to Jan 2020); period 2 - under the shutdown policy of lottery (from Jan 2020 to Feb 2020); period 3 – after the return of the lottery (from Feb 2020 to Mar 2020). The setting of the lottery motivates the audience to give small virtual gifts (which satisfy the lowest threshold set by a host) to win prizes (set by the hosts) when hosts give broadcasts. The prize of the lottery will be shown throughout the lottery process, which may last for several minutes.

The dataset includes lottery-level and room-level observations. At the room level, the data consist of total value of daily PAYW revenue for each room, number of fans in the room, number of subscription members, duration of live broadcasting, number of audience interactivities, and average hotness index of a room. At the lottery level, the data include prize value for each lottery in each room, number of prizes, threshold gift value for participation, lottery duration, number of participants, and total value of gifts given by participants. Below are the summary statistics of the dataset. The PAYW gifts ($PAYW\ Gifts$) are the revenue of virtual gifts given by the audience to hosts in RMB cent. $Fans$ is the number of fans for a host in a day. $AvgSubscriber$ stands for the average number of paid users who subscribe to a host in a day. $AvgHot$ is the average hotness index on the platform in a day. $AvgMsgUser$ is the number of users who send danmaku in a day. $LiveHours$ is the live broadcasting time for a host in a day. There are two kinds of lottery threshold: 1) paid threshold, charged as virtual gifts from users, and 2) free threshold, given by the platform for free. $PaidThreshold$ is the average paid threshold value for a host in a day. $FreeThreshold$ is the average free threshold value for a host in a day. In the data preprocessing process, we deleted hosts whose broadcasting days did not exceed 20 days during our observation period. We calculated the lottery level data into daily performance, and we matched the room data with the lottery level data. Finally, we got the daily performance of 2,374 rooms.

Variable	Period 1-2: After Lottery Block			Period 2-3: After Lottery Return		
	Observations	Mean	Std. Dev.	Observations	Mean	Std. Dev.
PAYW Gifts	94,847	11118.36	62778.03	58,931	15155.84	103252.1
Fans	94,847	409111.6	1043606	58,931	430165.5	1100968
AvgSubscriber	94,847	1740.078	6158.969	58,931	2034.186	7178.378
AvgHot	94,847	277117.3	592890.5	58,931	286396.6	818765.8
AvgMsgUser	94,847	2204.166	8053.608	58,931	2685.156	9478.328
LiveHours	94,847	7.973053	5.068165	58,931	8.284712	5.203506
PaidThreshold	94,847	1.970451	26.3054	58,931	4.999963	884.2707
FreeThreshold	94,847	3.549455	84.08207	58,931	7.123441	125.0111

Table 1. Descriptive Statistics

Identification Strategy

The shutdown policy of lottery on the platform provides a unique quasi-natural experiment setting. First, we use k-means clustering to identify the treatment group of hosts with the habit of conducting lottery in their daily broadcasting. Secondly, we use k-nearest neighbors (KNN) matching to find comparable observations between the treatment group and the control group. Lastly, we utilize difference-in-differences (DID) method to estimate the causal effect of the lottery policy on PAYW revenue ($PAYW_{it}$).

K-means Clustering

During the block of the lottery function, all hosts cannot start lottery in this period. Because lottery blocking is performed on the entire platform, there are no natural treatment and control groups. Instead, we identify hosts that routinely conduct lottery as the treatment group, whose PAYW revenue is most likely affected by

the lottery block. Hosts who do not or occasionally conduct lottery are controls, as their revenue may not be affected much after the lottery function is turned off.

We use the data before the block period with K-means clustering to identify hosts who have a habit of lottery with three variables (lottery count, lottery ratio, and expiration time of lottery), which are decided by the hosts themselves. Lottery count stands for the total number of lotteries held by a host before the block policy. Lottery ratio is the percentage of the number of days in which a host draws lottery to the total number of live days. Expiration time of lottery is the total duration of lottery before the block policy. Finally, we get 428 treatment hosts who routinely conduct lotteries while broadcasting. As shown in Figure 1, we obtain a scatterplot of the treatment and the control groups in three-dimensional space. We see that the treatment group (red points) is distinct from the control group regarding the lottery habit in these three aspects.

KNN Matching

To find an comparable control group and balance the effects of the covariates, we use the k-nearest neighbors (KNN) matching algorithm to find the treatment group and the control group based on similarity. We utilize Mahalanobis distance (Equation 1) to measure the similarity between hosts because host features would be correlated and the variance among features is large. We use one-to-two matching and got 428 hosts in the treatment group and 856 hosts in the control group.

We use six variables to conduct KNN matching: number of fans, number of danmaku, scores given by a third party, broadcasting time, average online audience of room, and subscription members of the room. All six features are not related to the value of PAYW gifts but reflect hosts' performance level. We also plot the distribution of the treatment group and the control group before the block strategy in Figure 2. We see that the distributions (before block) between the treatment group and the control group are similar.

$$D_M(x,y) = \sqrt{(x-y)^T \Sigma^{-1} (x-y)} \tag{1}$$

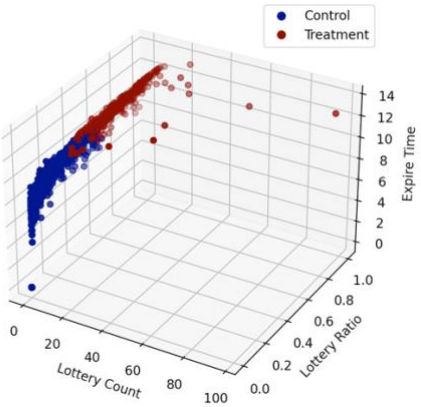

Figure 1. Plot of Treatment Group and Control Group (After Clustering)

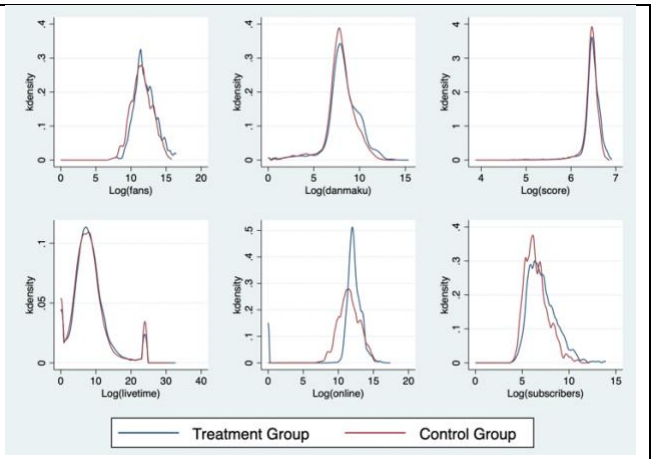

Figure 2. Distribution of Treatment Group and Control Group (After Matching)

Difference-in-Differences (DID)

We construct the model specification after matching as follows:

$$PAYW_{it} = \gamma_0 + \gamma_1 AfterTreat_{it} + \gamma Z_{it} + \mu_i + \lambda_t + \varepsilon_{it} \tag{2}$$

where $AfterTreat_{it}$ includes the different policy treatments: $AfterBlock_{it}$ and $AfterReturn_{it}$. $AfterBlock_{it}$ equals 1 if hosts are in the treatment group post-block (period 1-period 2); otherwise, $AfterBlock_{it}$ equals 0. $AfterReturn_{it}$ equals 1 if hosts are in the treatment group post-return (period 2-period 3); otherwise, $AfterReturn_{it}$ equals 0. $PAYW_{it}$ is the revenue of PAYW for room i at day t. γ_1 captures the causal effect between the block/return policy of lottery and the PAYW revenue. Because the

treatment of block is opposite to the treatment of return, we expect that γ_1 is of opposite signs (H1a and H1b). Z_{it} is a vector of control variables, including the log of fans, log of subscription users, log of online hotness index, live hours, log of users who send danmaku, holiday dummy, average hot index when conducting lottery, lottery participants in previous week, and lottery count in the previous week. μ_i and λ_t capture individual and time-fixed effects. ε_{it} is the error term assumed to be $i.i.d.$ normal $\varepsilon_{it} \sim N(0, \sigma_\varsigma^2)$.

We next turn to the moderation effect of lottery threshold on PAYW gifts. The model is specified as follows:

$$PAYW_{it} = \alpha_0 + \beta_0\, AfterTreat_{it} + \beta_1\, Threshold_{it} + \beta_3 AfterTreat_{it} \times Threshold_{it} + \beta_j Z_{it} + \mu_i + \lambda_t + \varepsilon_{it} \quad (3)$$

where $Threshold_{it}$ includes two aspects of the thresholds, $PaidThreshold_{it}$ and $FreeThreshold_{it}$. Moreover, we conduct analysis to pre-test the parallel trends assumption.

Results

Columns 1-3 in Table 2 presents the results of lottery block on PAYW gifts (H1a). Column (1) shows the DID regression model capturing the impact of blocking lottery with robust standard errors and individual fixed effects. The results show a negative and significant effect of lottery block on PAYW gifts ($\gamma_1 = -0.168, p < 0.01$). In column 2, we add day fixed effects to eliminate time-related confounders, and the results are consistent ($\gamma_1 = -0.091, p < 0.01$). In column 3, we add more control variables, including the log of fans, log of subscription members, log of the online hotness index, live hours, log of users who send danmaku and lottery characteristics. The results show that lottery block decreases PAYW gifts revenue by 6.7% ($p < 0.01$), which supports H1a.

Column 4-6 in Table 2 presents the results of lottery return on PAYW gifts (H1b). The expected estimation of lottery return (column 4-6) should contradict the estimation of lottery block (column 1-3). We conduct regression analysis using DID with panel data and add individual fixed effects (column 4), day fixed effects (column 5), and control variables (column 6) step by step in columns 4-6. The estimates are consistent and significant at 1% level. The results show that lottery return increases PAYW gifts revenue by 10% ($p < 0.01$), which supports H1b.

	Period 1-2: Lottery Block			**Period 2-3: Lottery Return**		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
$AfterBlock_{it}$	**-0.168*** **	**-0.091** **	**-0.067** **			
	(0.035)	**(0.043)**	**(0.039)**			
$AfterReturn_{it}$				**0.506*** **	**0.185*** **	**0.101** **
				(0.038)	**(0.044)**	**(0.041)**
Constant	8.005***	7.861***	1.082	8.043***	7.768***	0.016
	(0.003)	(0.026)	(0.727)	(0.00717)	(0.0281)	(0.375)
Robust	√	√	√	√	√	√
Individual FE	√	√	√	√	√	√
Day FE	×	√	√	×	√	√
Controls	×	×	√	×	×	√
R-squared	0.002	0.021	0.373	0.025	0.071	0.436

Table 2. Estimates of Lottery Block/Return on Total PAYW Gifts

Notes: *** p<0.01, ** p<0.05, * p<0.1; number of observations for column 1-3 is 94,847; number of observations for columns 4-6 is 58,931; number of host rooms for column 1-6 is 1,284.

To test the moderation effect of lottery threshold, we present tests of Hypothesis 2 on the strengthening effect of higher threshold (H2). We examine the estimates from DID analysis in Table 3, in which we divide lottery threshold into two types, paid virtual gifts and free virtual gifts for participation. We find that after lottery block, the effect from prizes with higher threshold value on PAYW gifts performance suffered more when lottery was blocked. First, we analyze the effect of threshold from period 1 to period 2 when the platform shutdown the lottery policy. $AfterTreat_{it}$ stands for $AfterBlock_{it}$ or $AfterReturn_{it}$. In column 1, the interaction term between $AfterBlock_{it}$ and $FreeThreshold_{it}$ is insignificant ($\beta_3 = -0.076, p > 0.1$), which indicate that the free threshold does not moderate lottery block. We suspect that free virtual gifts are given by the platform and may be paid by the audience to hosts casually regardless of whether there is a lottery. In column 2, the interaction term $AfterBlock_{it} \times PaidThreshold_{it}$ is negative and significant ($\beta_3 = -0.001, p < 0.01$). The estimates from column 2 indicate that lottery with a higher paid threshold may suffer more from lottery block, which supports H2 on the moderation of threshold value.

	Period 1-2: Lottery Block		**Period 2-3: Lottery Return**	
	(1)	**(2)**	**(3)**	**(4)**
$AfterTreat_{it}$	-0.061	0.064**	0.101**	0.100**
	(0.038)	(0.039)	(0.041)	(0.041)
$FreeThreshold_{it}$	0.022**		-0.007	
	(0.009)		(0.013)	
$AfterTreat_{it}$	**-0.076**		**-0.003**	
$\times FreeThreshold_{it}$	**(0.076)**		**(0.021)**	
$PaidThreshold_{it}$		0.001***		0.000
		(0.0004)		(0.000)
$AfterTreat_{it}$		**-0.001****		**0.002****
$\times PaidThreshold_{it}$		**(0.0004)**		**(0.001)**
Constant	1.087	1.081	0.016	0.015
	(0.746)	(0.747)	(0.376)	(0.375)
Individual FE	√	√	√	√
Day FE	√	√	√	√
Control Variables	√	√	√	√
Robust	√	√	√	√
Holiday Effects	√	√	√	√
R-squared	0.373	0.372	0.436	0.436

Table 3. Moderation Effects of Lottery Thresholds

Notes: *** p<0.01, ** p<0.05, * p<0.1; number of observations for column 1-2 is 94,847; number of observations for columns 3-4 is 58,931; number of host rooms for column 1-4 is 1,284.

We also provide additional analysis in column 3 and column 4 after the lottery function returns. $AfterTreat_{it}$ stands for $AfterReturn_{it}$. The coefficient of $AfterReturn_{it}$ (after the lottery returns) is expected to be opposite to the coefficient of $AfterBlock_{it}$ (after the lottery blocks). In column 3, the interaction term $AfterReturn_{it} \times FreeThreshold_{it}$ is not significant ($\beta_3 = -0.003, p > 0.1$), which is consistent with that in column 1. Results in column 1 and column 3 indicate that the free threshold does not moderate the effect of lottery. In column 4, the interaction term between $AfterReturn_{it}$ and $PaidThreshold_{it}$ is positive and significant ($\beta_3 = 0.002, p < 0.01$), indicating lottery with higher paid threshold may increase PAYW more after lottery return. The results in column 2 and column 4 are consistent and support H2 that higher value of paid threshold can strengthen the effect of lottery on PAYW gifts value.

Robustness Check

This study also utilize propensity score matching, which captures the probability of hosts in the treatment group (hosts who have the habit of conducting a lottery). The results of lottery block are shown below, which are consistent with those from Tables 2 and 3.

	(1)	(2)	(3)	(4)
$AfterBlock_{it}$	**-0.312****	**-0.253***	**-0.221*****	**0.070**
	(0.101)	**(0.112)**	**(0.056)**	**(0.056)**
$PaidThreshold_{it}$				**0.518*****
				(0.026)
$AfterBlock_{it} \times PaidThreshold_{it}$				**-0.375****
				(0.161)
Constant	6.107***	6.041***	1.509***	1.520***
	(0.004)	(0.059)	(0.311)	(0.309)
Robust	√	√	√	√
Individual FE	√	√	√	√
Day FE	×	√	√	√
Controls	×	×	√	√
R-squared	0.004	0.016	0.469	0.048

Table 4. Robustness Check of Lottery Block on Total PAYW Gifts

Notes: *** p<0.01, ** p<0.05, * p<0.1; number of observations for column 1-3 is 94,847; number of observations for columns 4-6 is 58,931; number of host rooms for column 1-6 is 1,284.

Conclusion and Limitation

This study investigates the impact of lottery on PAYW gifts revenue in the live streaming context. PAYW is the primary source of income for hosts on live streaming platforms. Using a difference-in-differences design, we find that blocking of lottery, a novel function in live streaming, hurts PAYW revenue while lottery adoption boosts the PAYW revenue. Moreover, we find that lottery threshold exerts a moderative effect on the lottery function: a higher participation threshold cost strengthens the effect of lottery block on PAYW revenue.

This study contributes to the IS literature on PAYW, live streaming and lottery. Since previous literature has investigated PAYW from the angles of audience size (Lu et al., 2021) and emotion (Lin et al., 2021), we study PAYW from the perspective of lottery, providing new insight into audience opportunism and impulsiveness in gifting behavior. Besides, we leverage platform policy as a quasi-natural experiment to identify the causal effect of lottery on PAYW.

For practical implications, we provide guidance for both platforms and hosts on how to utilize the new lottery mechanism to generate more popularity and revenue. For live streaming platforms, platforms that do not adopt the function may consider introduce lottery function to improve user interactivity and avoid free-rider problems in PAYW. For live streaming hosts, our study informs hosts about how to design lottery parameters to attract more PAYW gifts. They should also carefully consider whether to adopt lottery as a routine. In addition, hosts should dynamically change lottery thresholds to gain more profits. Our results suggest that higher lottery threshold can strengthen the lottery effect.

We will enrich our preliminary analysis in future research in the following ways. First, we want to analyze the mechanisms of how lottery affects PAYW gifts. Second, we will conduct a lottery-level analysis to examine the mechanisms through which threshold costs moderate the lottery effect and find why paid/free thresholds exert different moderation effects. In addition, we will conduct more robustness checks and sensitivity tests through alternative matching procedures, including one-on-one matching, different matching criteria, different matching methods, and different clustering algorithms.

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