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### Do Loyal Customers Pay More in Live Streaming?

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# **Do Loyal Customers Pay More in Live Streaming?**

*Completed Research Paper*

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## **Abstract**

*With the rise of the live streaming industry, streamers are facing stiff competition. While there is a common perception that loyalty generates more profits for the firm, there is also conflicting evidence that loyal customers may not be charged more. The live streaming context provides an ideal setting to empirically examine the value of loyal customers and offers a new dimension for measuring behavioral loyalty. Our results suggest that customers with higher consumption loyalty generally pay less while those with higher social loyalty tend to voluntarily pay more. Moreover, there is a crowding-out effect for the same type of resources and a compensation effect between different types of resources concerning the relationship between historical and current inputs. Theoretical explanations drawn on the social exchange theory and practical implications are discussed.*

**Keywords:** Customer loyalty, live streaming, pay-what-you-want, social exchange theory

## **Introduction**

In recent years, live streaming services have emerged as a highly profitable Internet application with a rapidly growing audience. It presents real-time situations to end-users through instant and interactive Internet media. The industry is expected to be valued at \$247.3 billion globally by 2027<sup>1</sup>. In China, the market size has reached \$26.33 billion in 2021, with over 700 million viewers and 140 million streamers<sup>2</sup>. However, with the rise of the industry, streamers and livestreaming platforms are facing intense competition and great pressure to make a profit. To tackle this challenge, cultivating customer loyalty and increasing customer retention is regarded as one of the most important strategies. Many marketing activities aim to develop, maintain, or improve customers' loyalty to their products or services.

Loyalty refers to favorable attitudes toward a company and is manifested through repeat buying behavior (Keller, 1993). Loyal customers are commonly believed to generate more profit for companies and receive much attention. Prior studies have suggested that loyalty can increase profits in a variety of ways. It

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<sup>1</sup> <https://www.prnewswire.com/news-releases/global-live-streaming-market-is-projected-to-reach-247-billion-by-2027-301290473.html#:~:text=A%20report%20from%20Market%20Research%20Future%20said%20that,continually%20at%2028.1%25%20CA GR%20throughout%20the%20forecast%20period.>

<sup>2</sup> <http://www.capa.com.cn/news/showDetail?id=182749>

increases revenues through higher spending and lower price sensitivity of loyal customers, while reducing the costs of serving customers who are familiar with the company (Srinivasan et al., 2002; Yee et al., 2010). However, competing evidence has emerged that loyal customers may not be charged premium prices (Umashankar et al., 2017). Loyal customers can receive deeper discounts in price negotiations which leads to a downward spiral of a company's pricing power (Kalwani & Narayandas, 1995). These discussions suggest that the conclusion on payment patterns for loyal customers remains ambiguous.

Despite the rich findings on loyalty in traditional business contexts, the value of loyalty in the context of live streaming has not been well studied. Little attention has been paid to loyal customers in live streaming, which leads to a lack of understanding of their behavioral patterns and profitability. Furthermore, the unique feature of live streaming provides a new component of loyalty. With high interactivity in live streaming, streamers create content that provides a real-time interactive experience between creators and viewers. Interaction plays a prominent role in shaping the viewers' experiences and driving them to pay (Ma et al., 2022). In the meanwhile, interaction has also been recognized as a key determinant of customer loyalty (Shen et al., 2010). However, the impact of repeated interaction behavior has been underemphasized as previous studies usually measure loyalty in terms of repeated purchase behavior in traditional transactions. Moreover, the participative pricing mechanism adopted by live streaming platforms separates interactions from purchases, providing an opportunity to independently assess the impact of loyalty built through different repeated behaviors of customers.

Therefore, we aim to explore the behavioral patterns of loyal customers in live streaming and to examine whether loyal customers generate more profit over time in their relationship with a particular streamer. To answer the research question, we draw on social exchange theory to identify loyalty along two dimensions, i.e., consumption loyalty and social loyalty, and to propose our hypotheses. Then we construct a panel data of 20,623 viewers across a period of 90 days and employ the Heckman two-stage model to provide empirical evidence. Our findings indicate that the current voluntary payments tend to decrease with consumption loyalty but increase with social loyalty. And the effects of loyalty on both dimensions are even more pronounced for viewers who have extensive tipping experience on the platform and those who are at a later stage of their relationship with the streamer. However, a lively livestreaming environment can help to mitigate the negative effect of consumption loyalty on current payments. Furthermore, by considering the impact of both dimensions of loyalty on current payments and interactions simultaneously, we find that the historical repeated exchanges crowd out current inputs of the same resource, while facilitating current inputs of a different resource.

## **Literature Review**

### ***Customer Loyalty***

Customer loyalty can be defined in two dimensions. The first dimension pertains to favorable attitudes toward specific alternatives. Attitudinal loyalty refers to the psychological aspect of a consumer's commitment to particular alternatives and may encompass beliefs in the product/service superiority, as well as positive reactions toward the alternatives (Liu-Thompkins & Tam, 2013). The second definition underscores the behavioral facet of loyalty. Loyalty behaviors includes repeated purchases, spontaneous word-of-mouth recommendation, and relationship continuance, etc. (Pritchard et al., 1999) As customer loyalty encompasses attitudinal and behavioral elements, there are various metrics to measure the level of customer loyalty (Yi & Jeon, 2003; Sirdeshmukh et al., 2002). Attitudinal loyalty is usually measured with survey items and reflects the cognitive degree of loyalty, while behavioral loyalty primarily utilizes historical purchases to capture the level of monetary commitment to a particular object. Attitudinal loyalty may be manifested through behavioral responses such as repeat buying behavior (Keller, 1993). For any company, customer loyalty becomes meaningful only when favorable attitudes are translated into positive behavioral responses (Kumar & Shah, 2004).

Customer loyalty has long been considered as a key path to profitability. Studies show that loyalty can increase profits in several ways. Loyal customers usually have a lower price sensitivity and spend more. And it costs less to serve customers who are familiar with the company's products or services. In addition, the cost of acquiring new customers can be saved, as loyal customers can sometimes become free advertisers (Chaudhuri & Holbrook 2001; Srinivasan et al., 2002). The underlying rationale is that loyal customers are more satisfied with the products/services and are willing to pay a premium (Hallowell, 1996). However,

prior research has found some conflicting evidence on the behavioral patterns of loyal customers and questioned whether they could be charged more. As customers stay longer with the company, they could demand a reward for their loyalty and spend less (Kalwani & Narayandas, 1995; Reinartz & Kumar, 2000). This may be due to the fact that they gradually become more price sensitive and have a narrower price acceptance over time (Wieseke et al., 2014). Though few studies have attempted to reconcile the competing results by identifying the drivers of behavioral loyalty (Liu-Thompkins & Tam, 2013; Umashankar et al., 2017), the relationship between behavioral loyalty and profitability remains ambiguous.

Compared to the rich exploration of customer loyalty in traditional business, the role of loyalty in live streaming has not been well investigated. Some studies define loyalty in the context of live streaming in terms of continuous watching intention, financial support, and word of mouth (Lim et al., 2020), which follows previous definitions of loyalty. While some research has discussed the factors that influence loyalty building (Huang et al., 2021), little literature provides evidence on the value of loyal customers in live streaming. Therefore, we aim to explore the behavioral pattern of loyal customers in live streaming and to examine whether they generate more profits over time in their relationship with particular streamers.

### ***Tiping behavior in live streaming***

Tiping is the most prominent behavior in live streaming as it is the main income source for streamers and livestreaming platforms (Lu et al., 2021). Tiping has received much attention since 1970s. It refers to a voluntary payment on top of normal prices that set for products and services and it often occurs when the service is already rendered (Lynn & Grassman, 1990). When tiping serves as an alternative business model for generating revenues, it is known as pay-what-you-want (PWYW) pricing. With PWYW pricing, consumers have full control over the price they pay, i.e., they can set any price (including zero) and the seller must accept (Kim et al., 2009). The profitability of PWYW depends on both the number of viewers and tip amount per viewer. Although neoclassic economic theory predicts that rational people want to maximize their economic utility by paying nothing, field evidence shows that people usually give non-zero payments under PWYW and demonstrates the great potential for PWYW application (Levitt, 2006; Kim et al., 2010). Live streaming industry is one of representative applications of PWYW pricing.

Existing literature has examined the motivations and payment decisions of tiping behavior from various perspectives. The incentives of tiping mainly include economic, psychological, and social factors. For economic men, they tip for acquiring better service in the future. For psychological and social considerations, people tip for their feelings of fairness and conforming to perceived social norms (Azar, 2007). Empirical evidence further suggests that psychological and social motivations are main enforcement mechanisms for tiping (Azar, 2020). Research on PWYW further indicates that social preferences of people, such as reciprocity and altruism, play an important role in driving them to pay voluntarily (Regner & Barria, 2009; Gneezy et al., 2010). As social preferences reflect concern for the well-being of others (Fehr & Schmidt, 2006), it offers a plausible explanation for voluntary payments where people present a deviation from the strong forces of material self-interest.

In the context of live streaming, findings on the tiping behavior are in line with previous results. While viewers engage in livestreaming to satisfy their various needs, their payment decision is most affected by interactions and overall emotional attachment to streamers (Hilvert-bruce et al. 2018). Moreover, unique characteristics of live streaming highlight several factors that also influence viewers' tiping decisions. For example, Lin et al. (2021) found that positive emotions of streamers elicit more payments due to the high interactivity in live streaming. And Lu et al. (2021) stressed that a larger audience size discourages voluntary payments as social image concern arises when audience behaviors are publicly observable.

### ***Payment pattern of repeat customers in PWYW***

The payment patterns of repeat customers are one of important topics in research on tiping and PWYW, as the loyalty cultivated and reflected through repeated purchases could have an impact on customers' payment decisions (Kim et al., 2009). Prior studies generally demonstrated that repeat customers usually have a larger tip size than one-time customers (Lynn & McCall, 2000). However, it is inconclusive that whether repeat customers pay more over time. Several empirical evidences supported that the positive relationship between patronage frequency and tip size, which may be due to that repeat customers want to help sellers stay on the market or avoid embarrassment (Conlin et al., 2003). While other studies found the

previous purchases negatively influence current voluntary payments as customers may believe their previous payments have compensated the seller sufficiently (Regner & Barria, 2009). The finding that the average price paid in PWYW decreases over time also seems to add credence to the negative impact of patronage frequency on payments (Riener & Traxler, 2012; Gneezy et al., 2012). In the meanwhile, little attention has been paid to the regular customers in live streaming. Although there are studies exploring the payment pattern of long-life customers on the platform (Ma et al., 2022), we still know very little about the payment patterns of loyal customers.

## Summary

Although loyalty encompasses components of two dimensions (i.e., attitudinal loyalty and behavioral loyalty), behavioral loyalty has been favored in prior research because the behavioral outcomes of loyalty are more valuable to the company and easier to measure. We also emphasize the behavioral aspects of loyalty in our following discussion for two reasons. First, investigating the impact of behavioral loyalty could provide more practical implications as customer behaviors are easy to observe by streamers. Second, attitudinal loyalty at the customer level is typically measured through surveys and usually suffers from selection bias as only a sample customer base provides feedback (Kumar & Shah, 2004). While loyalty is considered a key factor in profitability, it remains a question whether loyal customers will generate more profit over time. Moreover, the relationship between previous purchases and voluntary payments in the PWYW setting is also ambiguous. Therefore, there is a lack of evidence regarding the value of loyal customers to streamers in the context of live streaming.

Furthermore, the high interactivity of live streaming is a unique feature that may influence the impact of loyalty on voluntary payments. Real-time interaction between viewers and streamers is a prominent component in live streaming, and viewers can participate in the co-creation of live content in multiple ways, such as tipping and sending messages. As social motivation is an important driver of tipping, frequent interactions may also have an effect on viewers' payment decisions. Nevertheless, the impact of frequent interaction has been less studied. Therefore, this paper aims to explore the payment pattern of loyal customers in live streaming, with high interactivity suggesting a new dimension of loyalty measurement.

## Hypothesis Development

We use social exchange theory (SET) as the overarching theoretical framework to propose our hypotheses (Emerson, 1976; Homans 1958). Loyalty is essentially a relational phenomenon (Jacoby & Kyner, 1973). Relationships are constituted of a series of repeated exchanges between two parties and evolve in response to interactions and fluctuations in contextual environment (Fournier, 1998). SET elucidates determinants and consequences of people's behaviors in social exchange relationships and reveals how the relationships evolve over time. One of the basic tenets of SET is that relationships evolve over time into trusting, loyal, and mutual commitment (Cropanzano & Mitchell, 2005), suggesting that SET provides an illuminating theoretical perspective for understanding the long-term relationship evolution. Therefore, SET offers a useful framework for loyalty-related research (e.g., De wulf et al., 2001, Wieseke et al., 2014), as well as the relationship building in live streaming context (Zhang et al., 2020). In an exchange relationship, streamers provide entertainment content while viewers provide support in various ways such as tipping and interaction. Another merit of adopting SET is that tipping behavior has been studied widely under this framework as an outcome in exchange relationships between service workers and their customers (Lynn & McCall, 2000; Lynn & Grassman, 1990).

The exchange requires bidirectional transactions between two parties, that is, something has to be given and something returned. In general, there are many rules and norms that guide exchange processes, such as negotiated rules, group gain and altruism. Reciprocity is most well-known and receives most research attention of these principles (Cropanzano & Mitchell 2005). According to the types of exchanged resources, exchanges include monetary exchanges involving tangible resources and social exchanges involving non-monetary, intangible resources (Heyman & Ariely, 2004). Different types of resources are likely to be exchanged in different ways. Though it is unclear that which rules apply to each resource, it seems that economic exchanges tend to be exchanged in a *quid pro quo* and closed-ended fashion, while social exchanges tend to be open-ended that entail unspecified and broad obligations on the part of both parties (Cropanzano et al. 2017). However, relationships sometimes could be treated as a combination of economic

exchanges and social exchanges rather than purely one type of exchange due to the complexity of reality (Tsui et al. 1997).

Viewers build their relationships with streamers through multiple engagement behaviors in live streaming. From the perspective of SET, these engagement behaviors are part of exchanges between viewers and streamers in nature. For viewers, they enjoy the entertainment content created by the streamer and obtain emotional value such as tension release. In the meanwhile, they engage in live process by tipping or interacting with streamers to repay for the streamer effort. Depending on the exchange resources given by the viewer, there coexists two types of exchanges. The viewer could tip the streamer thus constituting an economic exchange by inputting monetary resources. She/he could also interact with the streamer that requires their cognitive resources to write comments and give feedback, which involves the nature of social exchange. Streamers derive value from customer interaction as interactions are presented publicly along with the live streaming and create a lively vibe that attracting more viewers (Lin et al., 2021; Guan et al., 2021). Through repeat engagement behaviors with different types of exchanges, behavioral loyalty in different dimensions is cultivated and further demonstrated. We distinguish two types of behavioral loyalty: consumption loyalty based on repetitive tipping behaviors and social loyalty based on repetitive interaction behaviors. The two dimensions reflect behavioral preference for the streamer formed through different types of repeated exchanges. When viewers are faced with the voluntary payment decision, different loyalty could trigger different thinking schemes which in turn have differential effects on the motivation to pay.

While reciprocity is a general exchange rule, expectations regarding the reward of loyalty are different for viewers with different behavioral loyalty as they interpret the reciprocity norm in different ways. Specifically, economic exchange follows a *quid pro quo* way that underscores equity and efficiency of exchange. Social exchange is primarily concerned with the reciprocal nature of long-term relationships, where exists mutual giving by both parties without demanding equitable or immediate return (Cropanzano et al. 2017).

For viewers with high consumption loyalty, they consider the relationship more of an economic exchange relationship that emphasizes equitable exchanges with the streamer. While viewers create larger volume of economic value for the streamer, we speculate that they would perceive an imbalance between their input and return. As viewers may find it costly to remain loyal to a streamer as they have numerous alternatives, they may form expectation of reward for their loyalty (Wieseke et al. 2014). However, the value received from a particular streamer may diminish over time due to the broadcast nature of live streaming. As streamers have to spread their efforts over a large audience, viewers may gain inadequate attention from streamers and receive less entertaining experience. Price discount is a desirable option in addition to better service. Under PWYW pricing where viewers have the full control over the price they pay, viewers can realize price discounts themselves, thus leading to less voluntary payments.

*H1: Higher consumption loyalty leads to less voluntary payments.*

For viewers with high social loyalty, they treat the relationship more as a social exchange relationship in which their behaviors abide by the open-ended and forward-looking nature of the relationship. As long as viewers enjoy the content provided by the streamer and derives entertainment and psychological value from viewing experience, they feel obliged to reciprocate the streamer by providing social support. As viewers increase their interaction with the streamer, they would become more emotionally engaged and perceive a closer interpersonal relationship with the streamer (Lim et al., 2020), which strongly contributes to the provision of financial support (Wohn et al., 2018). Moreover, as viewers feel a higher emotional closeness with the streamer, social and psychological concerns arise when paying less (Azar, 2007). This suggests that viewers with higher social loyalty may provide more financial support to the streamer. Therefore, we propose the following hypothesis.

*H2: Higher social loyalty leads to higher voluntary payments.*

## **Empirical Context and Data**

### ***Live streaming industry and focal platform***

Live streaming is a novel form of online streamed media that is transmitted while recording, enabling users to watch or listen to the stream in real-time. Most live streams are delivered via multicasting, that is, multiple viewers can join in a single stream at the same time. As live streaming has rapidly gained global

attention in recent years, a large number of live streaming platforms have emerged that aggregate and connect viewers and streamers. Streamers initiate live streaming and provide content for viewers, while viewers can send chatting messages or virtual gifts to the streamer as they watch. For streamers and platforms, virtual gifts purchased with real-world money are the major source of profit. Total monetary value of the virtual gifts received by streamers will be shared between them and the platform.

Our focal platform is a major live streaming platform in China that entered the industry early and focused on entertainment live streaming. The platform provides so-called showroom live streaming where streamers perform talent shows such as singing, dancing, and talking, to entertain viewers. Each streamer has his/her own virtual room for live streaming, which corresponds to the streamer and can be uniquely identified. In a live session, the streamer is presented in the focus of the screen. Besides the streamer's content, viewers can receive the real-time information about the number of total viewers, gift-sending behaviors and chatting messages. Viewer can engage in the live session by clicking buttons to follow the streamer, send chatting messages, or send virtual gifts. Specifically, viewers tip the streamer by sending virtual gifts, the price of which is set by the platform.

To investigate the payment patterns of loyal customers, entertainment live streaming context provides an ideal empirical setting for two reasons. First, the PWYW pricing strategy is widely adopted by livestreaming platforms, which allows us to observe viewers' true willingness to pay through their voluntary payments. Furthermore, consumption and payment are separated in PWYW. As viewers can build loyalty through different repeated engagement behaviors during consumption, they may demonstrate behavioral loyalty on different dimensions and exhibit different payment patterns over time. Second, entertainment live streaming focuses on the streamer and the content he/she creates. By limiting our research scope to entertainment live streaming, we can avoid the possible influence of viewers' interest in commodities or games on payment decisions. And viewers' loyalty for a particular streamer can be considered as loyalty for a personal brand, which has relatively consistent outputs in terms of quality and style. By understanding the context from the perspective of personal brands, we can refer to theoretical lens that are applied to previous studies of traditional business contexts and compare our findings to them.

### ***Data and Variable Setting***

This study focuses on the 90-day data from December 1, 2016 to February 28, 2017 to study the impact of customer loyalty on their current payment to a particular streamer. We perform several procedures to construct the panel. First, as we are concerned with the historical behaviors of each dyadic relationship between viewers and streamers (hereafter referred to as pairs), our data have to cover all records of each pair from the first time the viewer visited the room. However, due to the lack of information on viewer registration time, we require focal viewers to be inactive (i.e., no watching, gift-sending, or message-sending behaviors for any streamer) in November 2016, i.e., 30 days prior to our observation period, which allows us to treat them as "new users" and observe their entire behavioral history with streamers. Second, focal viewers are required to be active (i.e., at least one watching, gift-sending, or message-sending behavior for any streamer) for each month of the observation period to construct longitudinal observation for each focal viewer. Third, the first observation of focal viewers has to be during the first four weeks of observation period (i.e., from December 1 to 29, 2016) to avoid potential disruption of holiday effects. Forth, we discard pairs with only one watching record as we focus on loyal customers with repeat visits. Therefore, we construct a panel of 20,623 viewers across a period of 90 days, including 3,774,267 observations in total.

As loyalty is manifested and enhanced by repeated exchanges, we choose the cumulative amount of tipping and the cumulative number of messages sent to the streamer to gauge the level of consumption loyalty and social loyalty. As viewers tip streamers by sending virtual gifts, the cumulative amount of tipping is calculated by adding up the price of all historical gifts sent to the streamer. Besides, we collect the watching, gift-sending, and messages-sending behaviors for each pair, as well as the performance metrics of each streamer. Following prior studies (Ma et al., 2022; Liao et al., 2021), we include three sets of control variables: the viewer's experience on this platform, her/his engagement behavior with the streamer, and others' engagement behavior with the streamer. The latter two sets of variables capture the current entertainment experience of the viewer and the social influence she/he may be exposed to. Table 1 gives the detailed definitions of variables included in our analysis and Table 2 provides the summary statistics for these variables over the observation period.

Variable	Definition
$tip\_amount_{ijt}$	Total amount of gifts sent by viewer $i$ to streamer $j$ on day $t$ (in ¥)
$tenure_{it}$	Number of days from the first observation of viewer $i$ to day $t$
$watchsum_{ijt}$	Total time of viewer $i$ watching streamer $j$ on day $t$ (in second)
$inter_{ijt}$	Number of chatting messages sent by viewer $i$ to streamer $j$ on day $t$
$room\_viewer_{jt}$	Number of viewers watching streamer $j$ on day $t$
$room\_qratio_{jt}$	Percentage of viewers watching streamer $j$ for a total time longer than 60 seconds on day $t$
$room\_othertip_{jt}$	Total amount of gifts sent to streamer $j$ by viewers other than viewer $i$ on day $t$ (in ¥)
$room\_otherinter_{jt}$	Number of chatting messages sent to streamer $j$ by viewers other than viewer $i$ on day $t$
$cumwatchfre_{ijt-1}$	Cumulative number of days that viewer $i$ has watched streamer $j$ up to day $t - 1$
$cumtip_{ijt-1}$	Cumulative value of gifts that viewer $i$ has sent to streamer $j$ up to day $t - 1$
$cuminter_{ijt-1}$	Cumulative number of chatting messages that viewer $i$ has sent to streamer $j$ up to day $t - 1$
<b>Table 1. Variable Descriptions</b>	

Variable	Obs.	Mean	Std. Dev.	Min	Median	Max
$tip\_amount_{ijt}$	3,774,267	3.15	126.71	0	0	67,567.1
$tenure_{it}$	3,774,267	34.81	22.80	0	32	89
$watchsum_{ijt}$	3,774,267	236.14	1,465.27	0	60	93,223
$inter_{ijt}$	3,774,267	2.09	22.16	0	0	12,931
$room\_viewer_{jt}$	3,774,267	2,771.85	3,736.77	1	1,282	29,741
$room\_qratio_{jt}$	3,774,267	0.70	0.23	0	0.71	1.00
$room\_othertip_{jt}$	3,774,267	5,248.38	45,116.88	0	872.79	2,365,584.75
$room\_otherinter_{jt}$	3,774,267	1,985.45	2,568.27	0	1,136	96,857
$cumwatchfre_{ijt-1}$	3,774,267	3.95	6.65	0	1	89
$cumtip_{ijt-1}$	2,826,824	63.99	1,998.46	0	0	354,204.28
$cuminter_{ijt-1}$	2,826,824	35.85	297.11	0	0	27,016
<b>Table 2. Summary Statistics</b>						

## Empirical Analysis and Discussion

### Preliminary exploration

To examine the relationship between viewers' behavioral loyalty in two dimensions and their current voluntary payment to a particular streamer, we estimate the following two-way fixed effects model. Our key dependent variable  $tip\_amount_{ijt}$  represents the total amount sent by the viewer to a particular streamer



on each day. And the main results of interest are the coefficients of  $cumtip_{ijt-1}$  and  $cuminter_{ijt-1}$ , which represent consumption loyalty and social loyalty respectively.

$$tip\_amount_{ijt} = \alpha_0 + \alpha_1 cumtip_{ijt-1} + \alpha_2 cuminter_{ijt-1} + \Pi X_{ijt} + \varepsilon_{ij} + \lambda_t + u_{ijt} \quad (1)$$

where  $X_{ijt} = (tenure_{it}, watchsum_{ijt}, inter_{ijt}, room\_viewer_{jt}, room\_qratio_{jt}, room\_othertip_{jt}, room\_otherinter_{jt}, cumwatchfre_{ijt-1})$

Following extant literature, we add several sets of control variables. First, we control for the viewer's characteristics  $tenure_{it}$  that represents the viewer's experience on this platform since he/she has been inactive for one month. Second, watching and message-sending behaviors on the focal day are controlled. Third, room-related characteristics on the focal day are added in the model, including watching, gift-sending, and message-sending behaviors of viewers who visit the streamer on the day except the focal viewer. We control for these variables to exclude the effect of social influence on the viewers' voluntary payment (Liao et al., 2021). Finally, we include dyad fixed effects rather than individual fixed effects to eliminate all time-invariant pair-specific heterogeneity such as the physical appeal of the streamer to the viewer, which somewhat relieves concerns about endogeneity. Day fixed effects are also included to account for factors changing each day that are common to all pairs for a given day. Moreover, we cluster the error terms at the dyadic level to account for the autocorrelation that may occur in the panel data. In all estimations, we use a log-log specification as the distributions of continuous variables are highly skewed.

The results of regression analysis are shown in Table 3, suggesting that viewers' voluntary payment is negatively correlated with cumulative tipping while the payment increases with cumulative interaction. And these results remain consistent after controlling for other behaviors of viewers in the streamer's living room and the streamer's performance on the day, which support our hypotheses.

	(1)	(2)	(3)
Log ( <i>cumtip</i> )	-0.1536*** (0.0068)	-0.1605*** (0.0061)	-0.1603*** (0.0060)
Log ( <i>cuminter</i> )	0.0090*** (0.0022)	0.0666*** (0.0027)	0.0665*** (0.0027)
Log ( <i>tenure</i> )		-0.0102** (0.0040)	-0.0097** (0.0040)
Log ( <i>watchsum</i> )		0.0107*** (0.0007)	0.0092*** (0.0007)
Log ( <i>inter</i> )		0.2808*** (0.0043)	0.2780*** (0.0043)
Log ( <i>cumwatchfre</i> )		-0.0038* (0.0020)	-0.0035* (0.0020)
Log ( <i>room_viewer</i> )			0.0090*** (0.0014)
Log ( <i>room_qratio</i> )			0.0066 (0.0063)
Log ( <i>room_othertip</i> )			0.0080*** (0.0006)
Log ( <i>room_otherinter</i> )			0.0000 (0.0012)

Constant	0.1146***	-0.0451	-0.1571***
	(0.0393)	(0.0377)	(0.0389)
Dyad fixed effects	Yes	Yes	Yes
Day fixed effects	Yes	Yes	Yes
N	2,826,824	2,826,824	2,826,824
R2	0.533	0.599	0.599
adj. R2	0.298	0.397	0.397
Note: Clustered standard errors in parentheses, * p < 0.10, ** p < 0.05, *** p < 0.01.			
<b>Table 3. Estimation Results of Preliminary Exploration</b>			

As we can only observe the amount of tipping only when the viewer decides to pay, the tipping data is left-censored and there are many observations with zero payment. Previous research showed that people tend to pay more when they decide to pay under PWYW pricing due to their concern of social image (Gneezy et al., 2012). Therefore, the amount of payment is related to the decision to pay, which suggests there may exist sample selection. We apply the Heckman selection model to address this issue.

### ***The Impact of Viewers' Loyalty on Current Voluntary Payment***

The Heckman two-stage model includes selection model and regression model to capture the decision process of sample users. The first stage Probit model estimates the probability of the viewer decides to tip the streamer. In the first stage,  $tip^*_{ijt}$  is the latent variable that represents the probability of viewer  $i$  send virtual gifts to streamer  $j$  on day  $t$  and  $tip_{ijt}$  denotes the observed tipping behavior that takes value of 1 if viewer  $i$  tip streamer  $j$  on day  $t$  and 0 otherwise.  $X_{ijt}$  includes a set of variables that could affect viewers' decision to tip the streamer or not on that day. While most control variables are the same with that in equation (1), we include other two variables that could affect viewers' decision to tip or nor, but could not directly affect viewers' decision of how much to pay, to satisfy the requirement to include exogenous variables in the first stage estimation. Specifically,  $tip\_totalfre_{it-1}$  represents the total frequency of viewer  $i$  tip any streamer on the platform since the start of the observation period up to day  $t - 1$ . And  $tip\_intention_{it-1}$  represents viewer  $i$ 's intention to tip on the platform, which is calculated by dividing the total frequency of viewer  $i$ 's tipping behavior by the total frequency of viewer  $i$ 's viewing experience on the platform from the start of the observation period up to day  $t - 1$ . The two variables capture the viewers' tendency to choose to pay for streamers based on their historical tipping behavior across the platform, which is unlikely to affect the amount of payment for a particular streamer.

$$tip^*_{ijt} = \alpha_0 + \alpha_1 cumtip_{ijt-1} + \alpha_2 cuminter_{ijt-1} + \Pi X_{ijt} + \varepsilon_{ij} + \lambda_t + u_{ijt} \quad (2)$$

Where  $X_{ijt} = (tenure_{it}, watchsum_{ijt}, inter_{ijt}, room\_viewer_{jt}, room\_qratio_{jt}, room\_othertip_{jt}, room\_otherinter_{jt}, cumwatchfre_{ijt-1}, tip\_totalfre_{it-1}, tip\_intention_{it-1})$

$$tip_{ijt} = \begin{cases} 1, & \text{if } tip^*_{ijt} > 0 \\ 0, & \text{if } tip^*_{ijt} \leq 0 \end{cases} \quad (3)$$

Conditional on viewers' decision to pay for the streamer (i.e.,  $tip_{ijt} = 1$ ), we estimate the following two-way fixed effect model similar to equation (1) in the second stage with adding the inverse Mills ratio derived from the first stage estimation results.

$$tip\_amount_{ijt} = \alpha_0 + \alpha_1 cumtip_{ijt-1} + \alpha_2 cuminter_{ijt-1} + \alpha_3 \widehat{IMR}_{ijt} + \Pi X_{ijt} + \varepsilon_{ij} + \lambda_t + u_{ijt} \quad (4)$$

where  $\widehat{IMR}_{ij} = \frac{\phi(\widehat{tip^*}_{ijt})}{\Phi(\widehat{tip^*}_{ijt})}$ ,

and  $X_{ijt} = (\text{tenure}_{it}, \text{watchsum}_{ijt}, \text{inter}_{ijt}, \text{room\_viewer}_{jt}, \text{room\_qratio}_{jt}, \text{room\_othertip}_{jt}, \text{room\_otherinter}_{jt}, \text{cumwatchfre}_{ijt-1})$

Table 4 reports the estimation results for the Heckman two-stage model. The significant coefficient of  $\widehat{IMR}_{ijt}$  in the second stage results indicates that sample selection occurs. Controlling for sample selection, the main results are consistent with preliminary exploration. Viewers with higher consumption loyalty pay less compared to other viewers. Whereas, viewers with higher social loyalty increase their voluntary payment to the streamer.

	(1)	(2)
	First Stage	Second Stage
Log ( <i>cumtip</i> )	0.1923*** (0.0014)	-0.1313*** (0.0121)
Log ( <i>cuminter</i> )	-0.1104*** (0.0016)	0.0406*** (0.0120)
IMR		0.4813*** (0.0469)
Constant	-2.2157*** (0.0187)	-0.7544** (0.3115)
Controls	Yes	Yes
Dyad fixed effects	No	Yes
Day fixed effects	No	Yes
N	2,826,824	113,735
R2		0.741
adj. R2		0.622
Note: Clustered standard errors in parentheses, * p < 0.10, ** p < 0.05, *** p < 0.01.		
<b>Table 4. The Impact of Viewers' Loyalty on Current Voluntary Payment</b>		

We then perform several robustness checks. First, we change the measurement of the dependent variable to the average amount of gifts sent per viewing of the pair on each day as the viewer could watch the streamer for several times a day. Second, we change the measurement of the key independent variables to the share of tip amount sent to the particular streamer in the total amount spent on the whole platform, which follows the idea that the proportion-of-purchase also gauges the level of behavioral loyalty (Kumar & Shah, 2004). Third, we include additional control variables in the Heckman two-stage model to rule out alternative explanations for our findings. Specifically, we add the amount of tip and the number of messages sent to the streamer in the viewer's most recent viewing experience to control for anchor effect. All the results support the validity of our main results.

### ***Heterogeneous Impacts of Viewers' Loyalty on Current Voluntary Payment***

The main results indicate that higher consumption loyalty may undermine current voluntary payments while higher social loyalty promotes payments. From the perspective of social exchange, it suggests that there is a crowding-out effect of the cumulative monetary exchanges on current monetary exchange behavior, yet the cumulative non-monetary exchanges encourage current monetary exchange. We first explore the heterogeneity of the main findings in terms of the characteristics of viewers and the stage of the relationship they are in with the streamer.

We start by considering viewers' tipping experience. For viewers frequently tip streamers during live streaming, they are more experienced in assessing which streamers and content are worthy of their voluntary payments. It promotes their emphasis on the price paid and induces higher price sensitivity. As

a result, they are more likely to expect a fair reward from the streamer. In the meanwhile, the value derived from non-monetary exchanges for viewers with frequent monetary exchanges could be higher, as they may gain satisfaction in the viewing process from a relationship-building perspective than from a money-for-service perspective. We estimate the moderating effect of *tip\_fre*, which measures the cumulative experience in tipping decisions of viewers. The results shown in Table 5 column (1) evidence this assertion. The negative effect of consumption loyalty and the positive effect of social loyalty on voluntary payments are both stronger for viewers with experience of tipping.

We also examine the dynamic impact of loyalty over the life cycle for viewer-streamer pairs. Throughout the lifecycle of a pair, viewers' interest in a particular streamer may gradually diminish over time and they can easily move elsewhere because there are so many alternatives. In our data, viewers who do not watch a particular streamer for at least one week before the end of the observation period, but are active at the same time, are considered lost viewers for the streamer. Of the total sample containing 947,443 pairs, 767,029 pairs have ended their relationship during our observation period. After identifying pairs for which a full record can be observed in our data over their lifetime, we construct a variable *life<sub>ijt</sub>* by dividing the cumulative number of days that viewer *i* has watched streamer *j*'s lives up to (and including) day *t* by the total number of watching days of the pair, indicating the life stage that the pair is at. The value of *life<sub>ijt</sub>* ranges from 0 to 1, where 0 represents the start of the life cycle and 1 represents the end. Employing the observations of pairs that end relationship during the analysis period, we add *life<sub>ijt</sub>* and its interaction terms with consumption loyalty and social loyalty to estimate the Heckman two-stage model. The results are shown in Table 5 column (2), suggesting that the negative effect of cumulative tipping gradually strengthens as the move towards the end of the lifecycle, as does the positive effect of cumulative interaction.

To investigate what factors can alleviate the negative impact of cumulative tipping, we explore the heterogeneity in our results with respect to the room environment. The environment of livestreaming room has been found to have an impact of viewer behavior (Liao et al., 2021). When observing the gift-sending and message-sending behavior of others, viewers may adjust their behavior under social influences. Specifically, if more people send gifts or messages to the streamer, viewers may perceive this as a signal of the quality of focal streaming content and the value drawn from the live streaming will increase. The results shown in Table 5 columns (3)-(4) support the idea that the negative impact of consumption loyalty can be mitigated in a relatively buzzy environment. However, the impact of social loyalty is not moderated by the environmental factors. This may be due to the fact that relationships established through historical non-monetary exchanges are inherently personal. Information about others' behavior may be perceived as less relevant to compliance with the norm of providing support, which results from accumulated social loyalty.

	(1)	(2)	(3)	(4)
Log ( <i>cumtip</i> )	0.0362*	-0.0383	-0.1929***	-0.2247***
	(0.0203)	(0.0260)	(0.0209)	(0.0292)
Log ( <i>cuminter</i> )	-0.0118	0.0024	0.0483**	0.0300
	(0.0189)	(0.0243)	(0.0188)	(0.0305)
Log ( <i>tip_fre</i> )	0.1693***			
	(0.0246)			
<i>life</i>		0.6196***		
		(0.2078)		
Log ( <i>tip_fre</i> ) * Log ( <i>cumtip</i> )	-0.0522***			
	(0.0049)			
Log ( <i>tip_fre</i> ) * Log ( <i>cuminter</i> )	0.0125***			
	(0.0046)			
<i>life</i> * Log ( <i>cumtip</i> )		-0.2868***		
		(0.0247)		
<i>life</i> * Log ( <i>cuminter</i> )		0.0642**		

		(0.0276)		
Log (room_othertip) * Log (cumtip)			0.0098***	
			(0.0025)	
Log (room_othertip) * Log (cuminter)			-0.0014	
			(0.0025)	
Log (room_otherinter) * Log (cumtip)				0.0142***
				(0.0039)
Log (room_otherinter) * Log (cuminter)				0.0010
				(0.0042)
IMR	0.7285***	0.5424***	0.4828***	0.4727***
	(0.0557)	(0.0751)	(0.0473)	(0.0474)
Constant	-1.4756***	-1.3716***	-0.5958*	-0.4154
	(0.3210)	(0.4378)	(0.3163)	(0.3237)
Controls	Yes	Yes	Yes	Yes
Dyad fixed effects	Yes	Yes	Yes	Yes
Day fixed effects	Yes	Yes	Yes	Yes
N	113735	48,440	113735	113735
R2	0.743	0.781	0.742	0.742
adj. R2	0.625	0.607	0.623	0.623
Note: Clustered standard errors in parentheses, * p < 0.10, ** p < 0.05, *** p < 0.01.				
<b>Table 5. Heterogeneity Analysis</b>				

### The Impact of Different Types of Loyalty on Both Monetary and Non-monetary Input

Our main analysis focuses on the voluntary payments, i.e., current monetary exchange behavior, which receives most attention from the platform and streamers as tipping is major source for making profits. Nevertheless, interaction behaviors also matter for increasing user stickiness and satisfaction with high interactivity a prominent characteristic of live streaming platform. Therefore, user non-monetary engagement is a crucial aspect that should be carefully studied and cultivated by platforms and content creators alike. Here we investigate the impact of behavioral loyalty on current monetary exchange as well as current non-monetary exchange behavior, to have a glance at the asymmetrical effect of historical exchanges on current exchange behavior for different resources.

With gift-sending behaviors representing current monetary exchange, messages-sending behaviors reflect current nonmonetary exchange determined by the viewer. While we take gift-sending and message-sending behaviors as dependent variables simultaneously, the mutual influencing relationship between the two types of exchange behaviors have to be accounted. Henceforth, we employ simultaneous equation model combined with the Heckman two-stage model to estimate the loyalty effects on exchanges for different resources. The simultaneous equations system is shown as equations (5)-(8).

$$\begin{cases} tip^*_{ijt} = \alpha_0 + \alpha_1 cumtip_{ijt-1} + \alpha_2 cuminter_{ijt-1} + \Pi X^1_{ijt} + \varepsilon_{ij} + \lambda_t + u_{ijt} & (5) \\ tip\_amount_{ijt} = \alpha_0 + \alpha_1 cumtip_{ijt-1} + \alpha_2 cuminter_{ijt-1} + \alpha_3 IMR\_tip_{ijt} + \Pi X^2_{ijt} + \varepsilon_{ij} + \lambda_t + u_{ijt} \text{ if } tip^*_{ijt} > 0 & (6) \\ inter^*_{ijt} = \alpha_0 + \alpha_1 cumtip_{ijt-1} + \alpha_2 cuminter_{ijt-1} + \Pi Z^1_{ijt} + \varepsilon_{ij} + \lambda_t + u_{ijt} & (7) \\ inter_{ijt} = \alpha_0 + \alpha_1 cumtip_{ijt-1} + \alpha_2 cuminter_{ijt-1} + \alpha_3 IMR\_inter_{ijt} + \Pi Z^2_{ijt} + \varepsilon_{ij} + \lambda_t + u_{ijt} \text{ if } inter^*_{ijt} > 0 & (8) \end{cases}$$

Where  $X^1_{ijt}$

$= (tenure_{it}, watchsum_{ijt}, inter_{ijt}, room\_viewer_{jt}, room\_qratio_{jt}, room\_othertip_{jt}, room\_otherinter_{jt}, cumwatchfre_{ijt-1}, tip\_totalfre_{it-1}, tip\_intention_{it-1});$

$X^2_{ijt}$

$= (tenure_{it}, watchsum_{ijt}, inter_{ijt}, room\_viewer_{jt}, room\_qratio_{jt}, room\_othertip_{jt}, room\_otherinter_{jt}, cumwatchfre_{ijt-1});$

$Z^1_{ijt}$

$= (tenure_{it}, watchsum_{ijt}, tip\_amount_{ijt}, room\_viewer_{jt}, room\_qratio_{jt}, room\_othertip_{jt}, room\_otherinter_{jt}, cumwatchfre_{ijt-1}, inter\_totalfre_{it-1}, inter\_intention_{it-1});$

$Z^2_{ijt}$

$= (tenure_{it}, watchsum_{ijt}, tip\_amount_{ijt}, room\_viewer_{jt}, room\_qratio_{jt}, room\_othertip_{jt}, room\_otherinter_{jt}, cumwatchfre_{ijt-1})$

The results are shown in Table 6, with columns (1)-(4) corresponding to estimations of equation (5)-(8). While supporting our main findings that consumption loyalty harms but the social loyalty promotes the current monetary payments, the results suggest that the consumption loyalty could increase but social loyalty inhibits the current interactions as well. That is, for the same type of resource input, the cumulative input has a negative effect on the current input, but for different types of resource input, the cumulative input of one resource has a positive effect on the current input of another resource. The crowding out effect of historical exchanges on current exchange for the same resource may be because the more resources invested, the smaller the marginal benefit it brings, and therefore viewers' price sensitivity of this resource increases and leads to investing a substituted resource to further maintain the relationship.

	(1)	(2)	(3)	(4)
	DV: Log(tip_amount)		DV: Log(inter)	
	First stage	Second stage	First stage	Second stage
Log(cumtip)	0.1628*** (0.0014)	-0.1987*** (0.0154)	-0.0605*** (0.0025)	0.1877*** (0.0147)
Log(cuminter)	0.1771*** (0.0043)	0.1212*** (0.0260)	0.3296*** (0.0011)	-0.0410*** (0.0100)
Log(inter)	0.3436*** (0.0209)	0.4583*** (0.1004)		
Log(tip_amount)			-0.4699*** (0.0177)	1.1668*** (0.0874)
IMR		-0.0859 (0.0789)		0.3951*** (0.0322)
Controls	Yes	Yes	Yes	Yes
Dyad fixed effects	No	Yes	No	Yes
Day fixed effects	No	Yes	No	Yes
N	1,859,641	102,205	2,826,824	339,152
R2		0.712		0.672
adj. R2		0.579		0.500
Note: Clustered standard errors in parentheses, * p < 0.10, ** p < 0.05, *** p < 0.01.				
<b>Table 6. The Impact of Different Types of Loyalty on Both Monetary and Non-monetary Input</b>				

## **Conclusion and Implications**

This study investigates the impact of viewer's behavioral loyalty on current voluntary payments with the loyalty defined in two dimensions, i.e., consumption loyalty and social loyalty. By employing the Heckman two-stage model, we found that higher consumption loyalty leads to less voluntary payments while higher social loyalty causes higher payments. Based on the social exchange perspective, different aspects of reciprocal principle are stressed through historical exchange behaviors with different resources. For consumption loyalty built in monetary exchanges, viewers driven by reciprocal consideration tend to pursue an equitable exchange relationship that the streamer give fair reward back. With the interest erosion for the streamer, viewers take price discounts as a self-realized reward and pay less to the streamer. However, for social loyalty cultivated in non-monetary exchanges, it motivates viewers reciprocal consideration that provide social supports to streamers with whom they have built interpersonal relationship through interactions. And related social and psychological concern such as social image dilution arises when viewers pay less. Thus, viewers with high social loyalty tend to increase their voluntary payments.

Furthermore, we find that viewers who are experienced in tipping may be more price-sensitive, which strengthens the negative effect of consumption loyalty on current payments. Whereas, they may perceive more satisfaction through interactions involving non-monetary exchanges, thus strengthening the positive effect of social loyalty. With respect to the dynamic pattern of loyalty effects, both negative impact of consumption loyalty and positive impact of social loyalty increases over the lifecycle of viewer-streamer pairs. For mitigating the negative impact of consumption loyalty, the environment in the streamer's room could help. When there are more tips and interactions in the room, the active environment highlights the high interactivity characteristic of live streaming and bring additive values to viewers' entertainment experience. And the social influence resulting from other viewers' engagement behaviors also push viewers to less focus on the pursuit of equitable relationships.

We finally investigate the relationship between historical exchange behaviors and current exchange behaviors for different types of exchange resource. In line with our main findings, there is a crowding out effect for the same type of resources and a compensation effect between different types of resources. The compensation effect indicates that more input from one type of resource promoting more input from the other, which could provide a lens for platform to manage and guide users' engagement behavior.

Our research contributes to extant literature in three ways. First, it adds to loyalty literature by examining the payment pattern of loyal customers in the context of live streaming. There has been a widespread perception that loyal customers generate more profits. However, a few studies provide controversial evidence for this assertion and we add new empirical evidence to this discussion. Rendering the advantage of PWYW pricing mechanism, we observe that the true willingness to pay of loyal viewers are decreasing with the behavioral loyalty that are measured through historical purchases. We further identify loyalty in a new dimension (i.e., social loyalty) cultivated through historical interactions and show its positive impact on current payments. Second, it contributes to live streaming research by investigating the value of loyal customers and noting the positive impact of room environment to relieve the eroded payment intention of consumption-loyal customers. While live streaming is a high interactive form of streaming services, viewer interactions are one important aspect for the platform operation and streamer's content generation. Though viewers with high consumption loyalty gradually decrease their voluntary payment, streamers can elicit more engagement behaviors from others to inhibit reduction of the economic profits of loyal customers. Moreover, social loyalty emerging from repeated interactions help increase the economic value of loyal customers. Third, our study adds to the social exchange theory by exploring the relationship between historical exchange behaviors and current exchange decision. We note that the relationship between payment decision and historical investment with the same or different recourses may be different. For the same type of resources, historical exchanges may crowd out the current exchange input, which is in line with previous findings in loyalty literature (Wieseke et al., 2014). While for different type of resources, we demonstrate that the historical input of one resource could complement with input for other resources.

Our findings provide important managerial implications for firms and streamers in the growing live streaming industry. For the firm, they should carefully define loyalty when constructing a value assessment system for loyal customers. Repeated behaviors towards a particular company is considered a measure of loyalty, but repeated behaviors in different aspects have different impacts on customers' economic value. In the context of live streaming, repeated purchases may inhibit viewers from paying in the future, but

repeated interactions stimulate higher willingness to pay. Therefore, live streaming platforms should also design mechanisms to encourage viewers to interact with the streamer through various forms. Increasing non-economic involvement in live streaming could enhance the social motive of the viewer, which helps to build relationships between the viewer and streamers and promote the viewer's economic contribution. For the streamer, they have to pay more attention to chatting messages they receive during the live streaming and give feedback to these interactions to create emotional bonds with their viewers. Thus, loyal viewers would have larger potential value to keep the streamer in the market longer.

However, there are several limitations in this paper. We discuss these limitations and propose potential research directions. Firstly, the data was collected during 2016-2017, the early stage in development of the live streaming industry. Researchers could use new datasets to test the robustness of our findings and to explore whether industry development may interact with the loyalty effect. Secondly, this paper measures the level of loyalty from the perspective of historical value created by the customer. It is an important component of the recency, frequency, and monetary value (RFM) framework, which summarizes customer characteristics based on their prior behaviors. As recency is also emphasized in common business practice (Reinartz & Kumar, 2000), we suggest that researchers could develop measures for a dynamic loyalty that captures the recent behavioral preference of the customer, and investigate whether loyalty based on historical or recent behavior would be a more useful predictor for future customer value. Thirdly, we focus on the behavioral components of loyalty without considering the attitudinal loyalty, which may lead to the problem of spurious loyalty (Kumar & Shah, 2004). We encourage researchers to conduct surveys to examine the consistency between behavioral loyalty and attitudinal loyalty. Finally, our study is based on secondary data analyses, which may encounter estimation bias resulted from some unobservable variables. Future research could conduct field experiments or design a causal inference framework to identify the impact of behavioral loyalty on voluntary payments and further demonstrate the mechanisms.

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