



## Research article

## A business model predicting the impact of live-stream marketing on firms' stock price - An event study

Shunjun Luo<sup>a</sup>, Maw-Liann Shyu<sup>b</sup>, Andri dayarana k. Silalahi<sup>b</sup>, I-Tung Shih<sup>b,\*</sup><sup>a</sup> Department of Innovation and Strategy, School of Management, Guangzhou University, Guangzhou, PR China<sup>b</sup> Department of Business Administration, Chaoyang University of Technology, Taiwan

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## ABSTRACT

Live stream marketing in China has been in the rage since 2019, and the e-commerce industry has expanded dramatically since the start of the pandemic. Internet celebrities, a growing number of people from different walks of life, movie stars, and TV hosts are now joining as live streamers. In February 2020, China's A-share stock market's Internet celebrity live streaming index rose by more than 20%. However, does adopting live stream marketing really have positive and significant impact on stock prices of listed companies? This study used event study analysis to investigate the impact of live stream marketing on stock prices of listed companies. After computing the normal rate (NR), abnormal rate (AR), cumulative average abnormal return (CAAR) of the subjects using EXCEL and SPSS and conducting a significant analysis of the CAAR, this study found that live stream marketing events have a positive influence on stock prices of listed companies.

Live streaming has brought new economic vitality, however, with the existence of chaos phenomenon on the unmaturing industry standards, access thresholds, and industry management at the same time. This study tries to organize a conceptual framework for discussion, and from a practical perspective, to summarize the reasons why companies use live stream marketing to influence stock prices: (1) Live stream marketing can boost sales in a short amount of time. (2) The stock price is influenced by live stream marketing's dramatic sales. (3) Brand awareness, which helps forecast the stock price, is promoted.

At the same time, live stream provides significant advantages for companies. However, there is no certain supporting business model predicting how live stream marketing significantly affects the companies' stock price. Therefore, the authors, from a theoretical perspective, tried to solve the problem by seeking a stable business model for predicting the influence of live stream marketing on the stock price.

In short, the influence of internet celebrity marketing has become a new significant variable and greatly impacted the firm's stock market price and the relevant research regarding this phenomenon is still scarce; it is necessary to study this hot topic at this stage, which is the research motive of this study.

## 1. Introduction

Companies that adopt Internet celebrity social media marketing strategies have experienced a big increase in their stock prices. According to Oriental Fortune Choice (2019), Internet celebrity social media marketing has developed dramatically during the COVID-19 pandemic through the 40% increase in the average price for 12 stocks regarding this concept. Jinzhi Ham (2020) identified a field company that had sold more than 10,000 bags of products in just 5 min with the help of Li Jiaqi, a well-known live streamer in China, with the sales volume topping 3 million Yuan. In the following two days, the company's stock price kept rising to around 700 million Yuan. It can be inferred that listed

companies who adapted live stream marketing will influence the trends in their stocks, especially during the COVID-19 pandemic when major cities around the world ordered a lockdown to avoid spreading the disease.

Due to its emerging marketing method that provides significant advantages, companies, adopting live stream as one of their marketing strategies, are currently lacking a business model explaining and supporting that live stream marketing is a significant factor affecting its stock price. The impact of live stream sales, a new style of marketing and promotion strategy, has caused a dramatic fluctuation in the sales, and its following impacts on the stock price. That is to say, the influence of internet celebrity marketing has dramatically influenced the firm's stock

\* Corresponding author.

E-mail address: [itungshih99@gmail.com](mailto:itungshih99@gmail.com) (I.-T. Shih).<https://doi.org/10.1016/j.heliyon.2022.e12522>

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market performance, and thus become a new significant antecedent of stock price performance. Nevertheless, the relevant research regarding this phenomenon is still scarce. Therefore, it is a need to investigate this interesting and highly topical topic at this stage, which is the research motive of this study.

Although published literature has demonstrated that live stream marketing has numerous advantages to the company (Liao et al., 2022), the development of models that can affect stock prices remains quite uncertain. Therefore, a number of companies are unsure whether this emerging marketing model is worth their investments due to the uncertainty of its benefits. This raises two questions: (RQ. 1) whether live stream marketing directly influences the stock prices of listed companies, and (RQ. 2) to which degree does the market respond to those listed companies that adopt this strategy? All these issues warrant further exploration. The issues mentioned above thus motivated the authors to solve the problem by seeking a stable business model for predicting the influence of live stream marketing on the stock price.

In terms of the published literature on live stream marketing, most focused on the said business model (Liao et al., 2022) and its influence on consumers' purchases (Xu et al., 2020); no one has conducted quantitative research on its influence on the stock price. In reference to previous literature on the Internet celebrity economy, this study utilized event study analysis to investigate the impact of live stream marketing on stock prices of listed companies. In this study, we present practical suggestions that listed companies can use to leverage live streaming marketing strategies to boost their stock prices.

Although live streaming has brought new economic vitality, its industry standards, access thresholds, and industry management are still in the early stage of development; traffic injection, sales fraud, and high return rates are currently controversial topics emerging one after another. However, live stream marketing is considerably advantageous for companies. From a practical and comprehensive perspective, this study, based on literature review results, summarized the reasons why companies use live stream marketing to influence stock prices:

- (1) Live stream marketing can boost sales in a short amount of time. For example, in a live streaming environment, celebrities and consumers can interact directly, and when consumers find the experience entertaining, playful, and interactive, they may purchase products directly (Wongkitrungrueng et al., 2020).
- (2) The stock price is influenced by live stream marketing's dramatic sales. In an event such as live stream marketing that makes a company's sales increase dramatically, the company's income, financial performance, and the stock price will be affected (Bacidore et al., 1997).
- (3) Brand awareness, which helps forecast the stock price, is promoted. Live streaming can increase the brand awareness of consumers. Influencers are also known as internet celebrities. Melzer and Zech (2018) suggest that influencer campaigns can increase brand awareness. If a company wishes to launch a new product or sell a new product through a live stream, celebrity endorsement can be beneficial to the company. And brand awareness is an indicator that can be used to forecast a company's stock price (Colladon, 2018).

In short, the reasons that live streaming marketing has a significant impact on a company's stock price include emerging markets in e-commerce, higher sales, increased brand awareness, and a higher level of engagement with celebrity followers. This is directly related to the observations we made in the study that impact the stock price of listed companies.

## 2. Literature review

### 2.1. The concept of internet celebrity

An Internet celebrity refers to a celebrity who has acquired their notability through the Internet. The phrase was first mentioned in some

news and journals back in 2005. However, it was not explicitly defined. Some journals stated that Internet celebrities are referred to as a group of people who can attract others' attention and develop their fame through the Internet. This is quite different from how we define the concept today. Although the number of Internet celebrities has been increasing in recent years, academia still has not agreed on a unified definition.

Shen et al. (2016) held that Internet celebrities are referred to as those who became famous online because some of their behaviors or events followed by netizens, either intentionally or unintentionally, under the influence of various factors such as internet groups, traditional media and mass psychology. They could be someone in real life or someone in the virtual world. Zheng (2017) maintained that Internet celebrities whose connotations could not be summarized in one sentence were a visual image and the product of technological development and social progress. Veissi (2017) believed that Internet celebrities were a group of opinion leaders who used the functionality of social platforms to deliver sales, brand awareness and web traffic to a business in return for compensation. Meili (2019) pointed out that Internet celebrities are referred to as 'influencers' on social media platforms such as Weibo and Zhihu. They have obtained recognition and have a certain number of followers because of their novel, distinctive and original posts. This study thus defined an Internet celebrity as a person who knows how to use their characteristics or abilities to attract a large number of followers on internet platforms for traffic monetization.

Previous researchers divided the development of Internet celebrities into three stages: 1.0, 2.0 and 3.0 (Cao et al., 2017; Zhu et al., 2018; Sun and Wang, 2019). In the 1.0 era, Internet celebrities referred to those people who became famous online because of their creative writings. They made money by publishing their works. In the 2.0 era, the Internet celebrities tended to acquire fame through publicity stunts, over-hype or aesthetic ugliness. They tried to gain the viewers' attention by posting pictures and words and making money by attending business activities. In the 3.0 era, the Internet celebrities referred to the key opinion leaders on social media platforms such as Weibo, Douyin and WeChat. They attract the attention of visitors through various forms of videos, pictures, and words. They could monetize their web traffic through e-commerce, product placement, or rewards and donations.

### 2.2. Internet celebrity economy and business model

Liming (2016) believed that the Internet celebrity economy referred to a series of economic effects produced by the influence of Internet celebrities' marketing activities on social media platforms on the values and lifestyle of their followers. Zhu et al. (2018) held that the Internet celebrity economy was the business model in which Internet celebrities themselves, or their team, regarded their followers as potential buyers and then utilized their public influence and Internet technologies to do targeted marketing in order to make a profit. Meili (2019) stated that the Internet celebrity economy was a model in which the Internet celebrities with a certain number of followers tried to monetize their influence. They would interact with their followers on various social media platforms through sharing pictures and words, live streaming, and emotional connection. In this way, they understood the demands and preferences of their followers; therefore, basing it they could influence their choice of products and decided to buy in accordance with their buying behaviors. In terms of the business model of Internet celebrity economy, Ying (2019) identified two monetization models: direct and indirect. Direct monetization refers to follower contribution, advertisement revenue and remuneration for training courses. The indirect monetization follows the business model of "contents + social media + e-commerce", which means Internet celebrities guide their followers to spend on some e-commerce platforms in order to make a profit. According to the 2020 China's Internet Celebrity Economy Market Prospects and Investment Research Report issued by the China Business Research Institute, there are two business models of the Internet celebrity economy. One is the "Internet celebrities + live streaming + e-commerce" model, in which

e-commerce platforms use the influence of Internet celebrities to perform live stream marketing and drive consumption. The other is the “Internet celebrities + incubators + supply chains” model, in which business incubators assimilate Internet celebrities to enhance their capability to attract followers and monetize the traffic.

### 2.3. The impact of the internet celebrity live stream marketing

The Internet celebrity economy started to boom in 2016. With the development of the live streaming industry, an increasing number of Internet celebrities were attracted to live streaming e-commerce platforms and enterprises gradually acknowledged their marketing capability (Wang, 2021). Starting from that time, many companies began doing Internet celebrity marketing, and thus academics followed suit to study the impact of the Internet celebrity live stream marketing.

Li (2016) stated the current status and advantages of “Internet celebrity + live streaming” and provided suggestions for enterprises adopting the new marketing model. From the perspective of communication and sociology, Fu (2017) pointed out that although Internet celebrities could show their true selves through live streaming video on their mobile devices to arouse the intense interest of common people, live video streaming still has some problems that need to be squarely faced and solved. Johansen and Guldvik (2017) surveyed to explore the relationship between Internet celebrity marketing and purchase intentions by distributing an online questionnaire through Facebook. From the responses they received from 180 respondents, they found that the Internet celebrity marketing had no direct effect on consumer purchase intention and was not a more efficient marketing strategy than regular online advertisements. Ewers (2017) found that brand attitude and message credibility had a higher level of impact on consumer purchase intention than on Internet celebrities. If consumers were not familiar with a product, the credibility of Internet celebrities was not enough to generate a higher level of consumer purchase intention.

In qualitative research by Nouri (2018), she pointed out that Internet celebrities brought up on Instagram and Youtube platforms had a higher level of influence on consumers than traditional celebrities. The reason is that consumers consider Internet celebrities to be more reliable and authentic. Through an experiment, Che et al. (2019) concluded that enterprises should choose the types of the Internet celebrity bloggers they cooperate with according to consumer perceptions of interactions, since this deliberation would help improve marketing efficiency. Liu et al. (2020) noted that because of their love for an Internet celebrity anchor, consumers would make irrational decisions to buy some products they were unfamiliar with. They also found that the personal charisma of Internet celebrities and the quality of products promoted through live streaming had a positive effect on consumer shopping behavior. Thus, suggesting that Internet celebrities create an optimistic personal image to gain more followers, increase interaction with them to win their trust, and then stimulate their desire to buy products. In the form of qualitative and quantitative research, Meng et al. (2020) observed that the credibility, professionalism, and interaction of the live streaming celebrities could enhance consumer purchase intention. Therefore, they suggested enterprises pay much attention to Internet celebrity marketing in order to deliver strategies more precisely.

The above literature shows that academics did not agree on the factors in the influence of the Internet celebrity live stream marketing on consumer purchase intention. Thus, more academics are needed for this issue and more factors should be considered to obtain a precise result.

### 2.4. Factors in fluctuations in the stock prices

Academics had started to study the factors in the fluctuations of the stock prices since the 1990s when the Chinese stock market was created. Jia (1992) discovered that the stock prices were influenced by various factors, including economic, political, capital, psychological, informational and speculative. Other academics investigated the factors of fluctuations of the stock prices in terms of national economic development,

governmental policies, public opinions, corporate performance, corporate reorganization and merges, and acquisitions, or investor behavior. For example, Du and Ruan (2019) analyzed 30 divorced top executives in listed companies, finding that the divorce of high-level executives had a negative effect on the stock price of their companies, which would cause a certain loss to the company. Li et al. (2020) studied the influence of Sino-US trade friction on listed companies in Chinese communication industries by using the event study method. Yuan et al. (2020) explored the impact of COVID-19 on the stock price of traditional Chinese medicine (TCM) companies listed in Shanghai or Shenzhen stock exchanges, noting that the COVID-19 event had a positive effect on the stock price of listed TCM companies in the short term.

The president of IDC China predicted in the Digital Transformation Summit 2019 that the global nominal GDP driven by digitally transformed enterprises would reach up to 46 trillion US dollars, accounting for 46 percent of the global economy. The digital wave has arrived, and an increasing number of companies are closely following the wave by carrying out digital transformations. Live stream marketing is one of their digital practices. In recent years, live stream marketing has been widely discussed from a variety of aspects, including purchase behavior (Sun et al., 2020), tourism e-commerce (Xie et al., 2022), virtual gifting (Liu et al., 2022), etc. However, no one has conducted an empirical analysis on the impact of live stream marketing on the stock price.

## 3. Research method

### 3.1. Samples

The sample used for this study consists of listed companies that conduct live streaming marketing events. Therefore, in order to ensure that the companies used as samples for this study are suitable, there are two stages of screening. First, the study selected a total of 87 listed companies in the Internet celebrity section (880791) of Tongdaxin APP, a Chinese online stock analysis and trading software, and used the live stream marketing events related to them as the research object. The data on the stock price of listed companies and the CSI 300 Index (CSI 300) were acquired from <http://www.cninfo.com.cn/new/index>. The data on live stream marketing were collected from Weibo, Taobao, corporate official websites, notices, and <https://www.p5w.net/>.

The reason for choosing Tongdaxin APP as the main source of big data for analysis is that Shenzhen has become the third city in China with a GDP exceeding 3 trillion RMB after Shanghai (2017) and Beijing (2018). In 2021, Shenzhen's GDP will be close to 1/4 of Guangdong's 12.4 trillion RMB. From the perspective of the global city rankings, Shenzhen ranks in the second circle with London, Paris, Chicago, Philadelphia, etc., and enters the top ten in the world. Among them, Tongdaxin APP Software of Shenzhen Fortune Trend Tech Co, Ltd is a very popular and general wealth management and analysis APP located in Shenzhen. Its professional analysis content includes comprehensive and completed financial big data for analysis, including industry analysis, industry chain analysis, investment portfolio analysis, each company's portfolio and analysis, daily financial indicators updates, valuation comparison between companies, industries, markets, and the like, so that the authors of this study used the industry analysis section in terms of company information in the Internet celebrity section provided by Tongdaxin APP Software of Shenzhen Fortune Trend Tech Co, Ltd.

Afterward, the procedures for selecting samples for this study include: All companies in the Tongdaxin APP, from 2017 to 2020 (Year), as long as the events involving live streamers and relevant product sales (information disclosed from companies' replying to information on interactive platforms and corporate announcements), are used as research objects. For example, on January 5, 2020, KOL Li Jiaqi broadcasted the product with the product of golden-character ham (No. 002515), and on January 13, 2020, Black Sesame (No. 000716) stated on the interactive platform that the company has cooperated with KOL Li Jiaqi, and KOL Wei Ya and also other websites in recent years. The business events of all those KOLs are all included for

analysis in this article. In the beginning, 87 companies were listed as research samples because they were involved in the live streamers' event. However, after comparison and verification, it was determined that 9 companies were not actually involved in the online live streamers' events so they were excluded. In the end, there were a total of 78 companies (146 live streamers' events). The sources of event data are the companies' replies to information on interactive platforms and corporate announcements online. The basic sources of the event person for analysis are KOLs, celebrities, and top executives as research samples. Next, in order to ensure the validity of the collected data, the authors continued to screen data and delete samples with low representative validity, according to the four conditions (A to D) listed below, and finally obtained 73 companies (a total of 139 live streaming events) as analysis samples. In the analysis process, this article divides the live streamers into three categories, including KOLs, celebrities and executives. This article defines the top 50 national live streamers in the first half of 2020 as the KOL. Celebrities generally refer to famous actors, singers, entertainers, etc., and executives refer to the presidents, vice presidents, general managers, and marketing directors of listed companies. In short, criteria for the inclusion of sample selection include: Year (2017–2020) X Contents of Events (Information disclosed from companies' replying to information on interactive platforms and corporate announcements) X Analytical objects of people (KOLs, celebrities, and top executives).

After the first round of sample screening, those listed companies not involved in the Internet celebrity live stream marketing field and that disclosed their live streaming information illegally, were eliminated. The number of listed companies remained at 78 and the sample size at 146. The second round of screening would be made in accordance with the following conditions:

- A. If the estimated window period of a sample is less than 130 trading days, then the sample would be deleted.
- B. If a trading halt occurs to a sample for more than 30 days during the estimated window period or event period, it would be deleted;
- C. If it is unclear when a sample occurs, it would be deleted.
- D. If a sample is not involved in the live stream marketing field, the sample would be deleted.
- E. After the second round of screening, the number of listed companies remained at 73 and the sample size at 139. The following tables show the distribution of time, staff, and information dissemination of the final sample. (Note: Why 30 days before an event and 30 days after an event are defined as an "event window". The rationale is that: 30 days is about a month, and for a company, it is almost a period of event occurrence and closing processing time.)

Taking Hangzhou Lianluo Interactive Information Technology Co., Ltd. (002280) as an example, although the live broadcast platform Banli Entertainment is launched, Hangzhou Lianluo Interactive Information Technology Co., Ltd's main business involves e-sports, film and television. And the company, in Shenzhen Stock Exchange, when replying to investors' questions, indicated that it did not involve the live broadcast of online celebrities with goods. Another case is that on September 9, 2020, the website of the Shanghai Stock Exchange published a letter from the Shanghai Securities Regulatory Commission stating that Leysen Jewellery Inc. (603900) released sensitive information related to online celebrity live broadcasts through non-legal information disclosure channels. The disclosure is incomplete, the risk warning is insufficient, and it violates the "Shanghai Stock Exchange Listing Rules", so this sample is excluded.

## 4. Analysis

### 4.1. Definition of the event

In this study, the day when the live stream marketing took place was taken as the event date ( $t = 0$ ). The period between 31 days before the event date and 130 trading days prior to the event date, i.e.  $[-31, -130]$ ,

was selected as the estimation window. The data of the closing price and the Shanghai Shenzhen CSI 300 Index for the 100 trading days were used for linear regression analysis. The period between 30 trading days before the event date and 30 trading days after the event date, i.e.  $[-30, 30]$ , was taken as the event window.

### 4.2. Calculation of expected and abnormal returns

This study utilized the market model, a simple and convenient model adopted by most academics, to calculate the expected returns. The market model improved the constant mean return model. It assumes a certain linear relationship between the return of individual stocks and the market rate of return. The formula is:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \epsilon_{it} \quad (1)$$

where  $R_{it}$  is the actual return of stock  $i$  on day  $t$ .  $R_{mt}$  is to the return of the market index on day  $t$ .  $\epsilon_{it}$  is the disturbance term in the regression equation and its average is 0.  $\alpha_i$  and  $\beta_i$  are regression coefficients.

Suppose the expected normal rate of return of samples within the event window would not be affected by sampling events, it can be calculated after estimating the value of  $\alpha_i$  and  $\beta_i$ . The equation is:

$$E(R_{it}) = \hat{\alpha}_i + \hat{\beta}_i R_{mt} \quad (2)$$

The abnormal return is the difference between the actual return and the expected return. The equation is:

$$AR_{it} = R_{it} - E(R_{it}) \quad (3)$$

Where  $AR_{it}$  is the abnormal return of stock  $i$  on day  $t$ .  $R_{it}$  is the actual return of stock  $i$  on day  $t$ .  $E(R_{it})$  is the expected return of stock  $i$  on day  $t$ .

### 4.3. Calculation of average abnormal return (AAR) and cumulative average abnormal return (CAAR)

The average abnormal return (AAR) is the average of the sum of the abnormal return of samples. The equation is:

$$ARR_t = \frac{1}{N} \sum_{i=1}^N AR_{it} \quad (4)$$

where  $N$  is the number of samples. The above equation can be described as follows: the AAR of 139 samples on the 139th day within the event window  $[-30, 30]$  is the result of dividing the sum of abnormal return of 139 samples by 139.

The cumulative average abnormal return (CAAR) is the sum of abnormal return of samples. The equation is:

$$CARR_t = \sum_{t1}^{t2} AAR_t \quad (5)$$

where  $t1$  is the starting time of selected event window,  $t2$  is the closing time of the selected event window. The above equation can be described as follows: within the event window  $[-30, 30]$ , the CAAR of 139 samples on the  $-30$ th day equals to the AAR of 139 samples on the  $-30$ th day, that is,  $CAAR-30 = AAR-30$ . The CAAR of 139 samples on the  $-29$ th day is the sum of the AAR of 139 samples on the  $-30$ th day and the AAR of 139 samples on the  $-29$ th day, that is,  $CAAR-29 = AAR-30 + AAR-29$ . The CAAR of 139 samples on the  $-28$ th day is the sum of the AAR of 139 samples on the  $-30$ th day, the AAR of 139 samples on the  $-29$ th day and the AAR of 139 samples on the  $-28$ th day, that is,  $CAAR-28 = AAR-30 + AAR-29 + AAR-28$ . In the same manner,  $CAAR30 = AAR-30 + AAR-29 + \dots + AAR29 + AAR30$ .

### 4.4. Significance test

The relationship between events and the stock prices cannot be determined only by calculating the value of CAAR. It also needs to test



the significance of the value. If the value can pass the test, it means the event is related to the fluctuation in the stock price. If not, there is no relationship between them.

This study used t-test, a statistical test adopted by most of foreign and domestic academics. In the present study, the significance level of CAAR was determined by means of a t-test. A number of previous studies have calculated the CAAR significance level using t-tests (Prusak and Potrykus, 2021; Rosenfeld, 1984). The formula is:

$$H_0: CAAR_t = 0 \quad H_1: CAAR_t \neq 0 \tag{6}$$

$$tCAAR = \frac{CAAR}{S(CAR_i)/\sqrt{N}}$$

where S(CAR<sub>i</sub>) is the standard deviation of the CAAR of the total number of sample size. A total number of sample size is comprised in this instance of the event window during which live stream marketing conducted, while N is the sample size, here is 139, t = -30, -29, ..., 29, 30.

## 5. Results

### 5.1. The total number of sample size

Figure 1 shows that live stream marketing affects the stock price of listed companies. The curve of AAR shows that it fluctuates widely during the period from the 30th day to the 20th day prior to the event. However, in the next 20 days, it fluctuates gently around zero. It starts to rise from the day before the event to the day after the event and reaches the highest value of 0.52 percent within the event window of -20 to 30 on the second day after the event. And then it drops rapidly and fluctuates around zero in the next 20 days with no value higher than 0.52 percent (see Figures 2 and 3).

The curve of CAAR shows that it fluctuates greatly before the event and reaches the peak value on the 26th day before the event. After that, it decreases quickly before increasing slowly. From the 15th day before the event to the first day before the event, it is still a positive number but shows a tendency to gradually decline. However, in the second day after the event, it rockets up to 2.01 percent. It then starts to swing up and down and reaches the lowest value of 0.89 percent on the 18th day after the event. But in the whole event window, the CAAR is 1.22 percent, which is above the significance level of 1 percent. This means live stream marketing events have a positive influence on the stock price of listed companies.

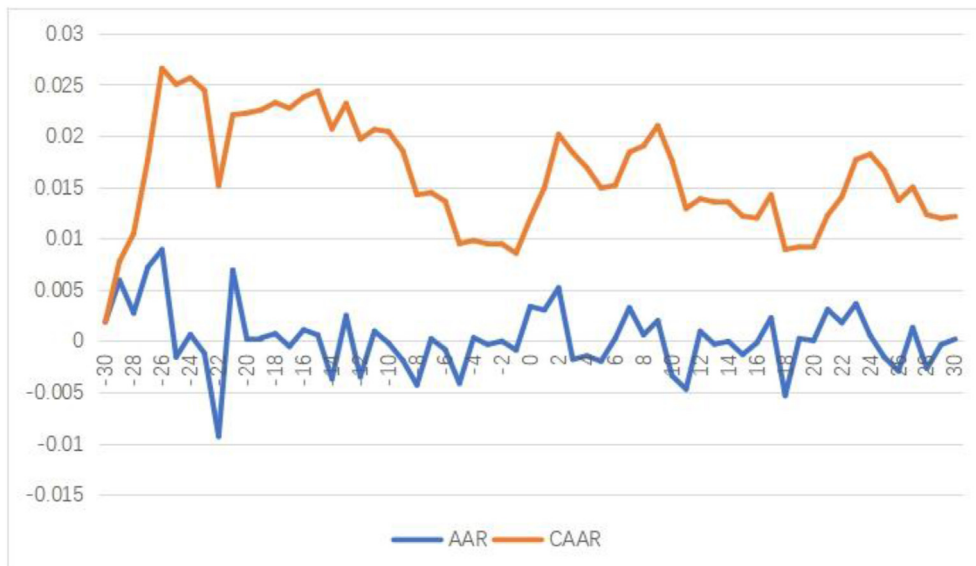


Figure 1. The AAR and CAAR of the total number of sample size.

Table 4 shows that the CAAR is not at the significant level in the event windows of [-5, 5] and [15, 30] but it is above the significance level of 1 percent in other event windows. It is clear that the value of CAAR is greater than 0 only in the event windows of [-30, -30], [-30, -15], [-30, 0], [0, 15], and [0, 30] (see Tables 1-3).

Through empirical testing, this paper concludes (Figure 1) shows the impact of live broadcast marketing on the stock price of listed companies), in [-30, -30], [-30, -15], [-30, 0], [0, 15], [0, 30], the cumulative abnormal return rate of listed companies involved in live streaming is positive; the tCAAR value is significant, in the event window of the live streaming, the cumulative abnormal return CAARt of listed companies' stocks is equal to zero. The null hypothesis is rejected; it shows that the live streaming event positively impacts the stock price of listed companies.

### 5.2. The overall live streamers

The curve of AAR shows that it fluctuates more considerably before the live streaming event than after the event. The value of AAR is at 0.7 percent on the 24th, 21st and 16th day before the event. The value is great in terms of the whole event window. On the day of the event, the AAR rises compared to the day before the event, but it does not reach the highest value in the event window of [0, 30] until the 15th day after the event.

The curve of CAAR shows that it fluctuates greatly before the event and reaches the highest value on the 11th day before the event. After that it decreases quickly and then experiences small fluctuations. It rises sharply on the 7th day after the event and then starts to decline. The value remains negative after the 10th day after the event.

Table 5 shows that the CAAR is greater than 0 only in the event windows of [-30, -15] and [-30, 0]. This means it passed the significance test.

### 5.3. The methods for disclosing live stream marketing information

The curve of AAR shows that it fluctuates around 0 within the event window and reaches the highest value of 1.05 percent on the day of the event.

The curve of CAAR shows that it presents an upward trend in the event window of [-30, 11] and reaches the highest value of 5.33 percent on the 11th day after the event. The CAAR increases rapidly from the second day before the event to the second day after the event. It shows a

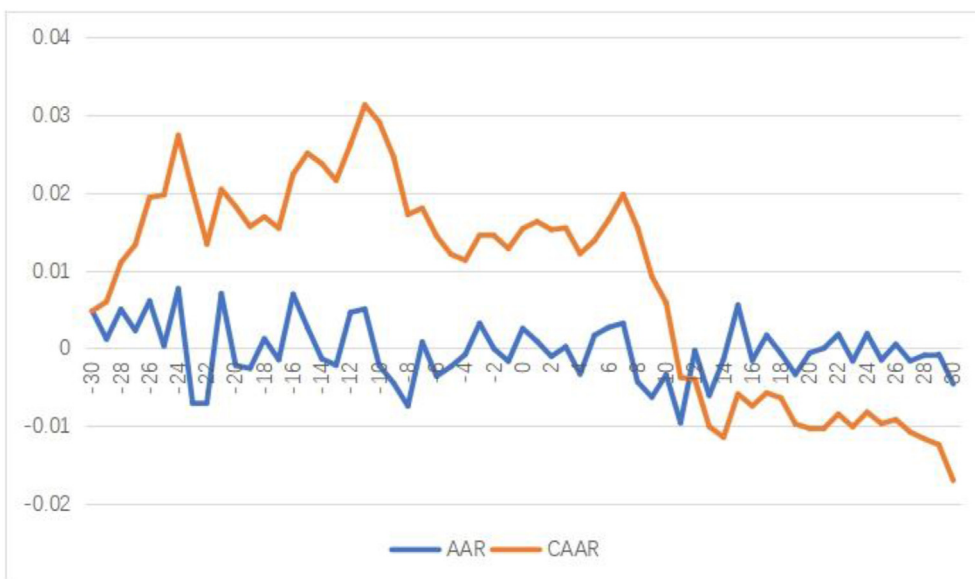


Figure 2. AAR and CAAR of overall live streamers.

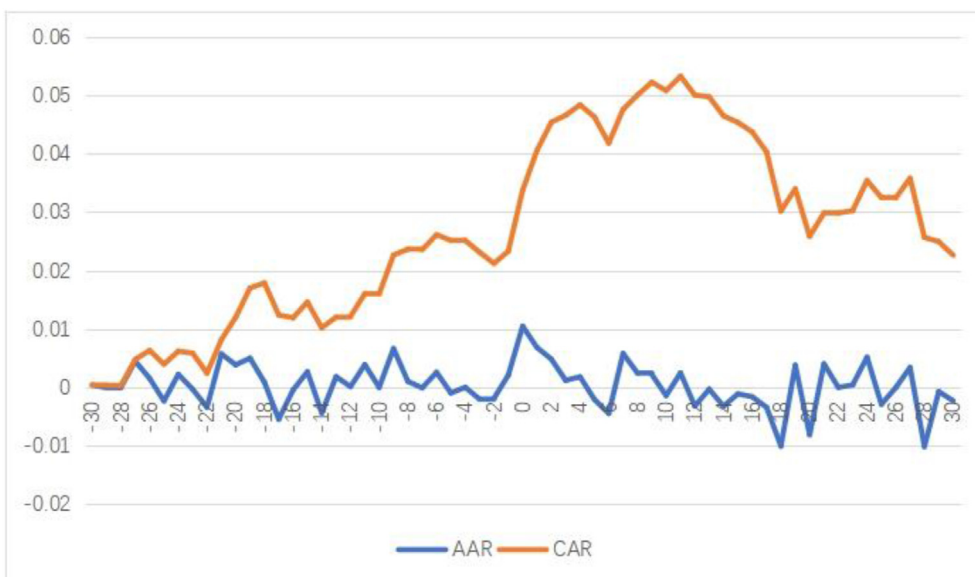


Figure 3. AAR and CAAR of the total number of sample size of the methods for disclosing live stream marketing information.

Table 1. The temporal distribution of the events.

Time	Sample size	Percentage (%)
2017	1	0.72
2018	7	5.04
2019	19	13.67
2020	112	80.58

Table 2. The distribution of living streamers in the sampling companies.

Staff	Sample size	Percentage (%)
KOLs	23	40.35
Celebrities	16	28.07
Top executives	18	31.58

downward trend after the 11th day after the event. However, the value on the 30th day after the event is 2.26 percent, which is still greater than 0.

Table 6 shows that the value of CAAR is greater than 0 in all the event windows except for the windows of [15, 30] and [0, 30], which means it passed the significance test.

#### 5.4. Classification of the live streamers

There are 57 samples related to live streamers, of which 23 is about key opinion leaders (KOL), 16 about celebrities, and 18 about top

Table 3. The distribution of information disclosure method for live stream marketing in the sampling companies.

Method	Sample size	Percentage (%)
Rely to information on interactive platforms	44	61.11
Corporate announcement	28	38.89

**Table 4.** CAAR of the total number of sample size in different event windows.

Event windows	Sample size	CAAR (%)	t-value	p-value
[-5, 5]	11	0.129	0.428	0.678
[-10, 10]	21	-0.301	-6.308	0.000
[-15, 15]	31	-1.162	-10.224	0.000
[-30, -30]	61	1.216	23.310	0.000
[-30, -15]	16	2.439	10.908	0.000
[-15, 0]	16	-1.186	-6.031	0.000
[-30, 0]	31	1.194	14.571	0.000
[0, 15]	16	0.361	10.108	0.000
[15, 30]	16	-0.153	-0.556	0.587
[0, 30]	31	0.359	10.541	0.000

executives. This study calculated the CAARs of the above three categories and then took a significance test. The results in the event window of [-30, 30] were shown in Table 7.

Figure 4 shows that the curves of KOLs and top executives are similar in pattern. Both reach at the first high point on the 24th day before the event and then start to fluctuate. However, they hit the second-high point at different time. The curve of KOLs is on the 11th day before the event while the curve of top executives is on the 12th day before the event. They also peak at different time. The CAAR of KOLs reaches the peak on the 6th day before the event while the CAAR of top executives on the first day after the event. After reaching the highest point, the CAAR of KOLs decreases more slowly than that of top executives. The CAAR of KOLs becomes negative on the 11th day after the event while the CAAR of top executives on the 9th day after the event. Although both show an upward trend in the next ten days, they remain negative (see Table 8).

The CAAR of celebrities show an upward trend in the event window of [-30, -11] and reaches the highest value of 5.44 percent on the 16th day before the event. Then it displays a downward trend and starts to plummet after the 11th day prior to the event. It becomes negative on the

**Table 5.** CAAR of overall live streamers in different event windows.

Event windows	Sample size	CAAR (%)	t-value	p-value
[-5, 5]	11	-0.058	-0.929	0.375
[-10, 10]	21	-2.542	-14.780	0.000
[-15, 15]	31	-2.824	-4.614	0.000
[-30, -30]	61	-1.695	4.905	0.000
[-30, -15]	16	2.506	10.876	0.000
[-15, 0]	16	-0.699	-1.802	0.092
[-30, 0]	31	1.538	15.774	0.000
[0, 15]	16	-1.869	-1.978	0.067
[15, 30]	16	-0.553	2.686	0.017
[0,30]	31	-2.977	-6.477	0.000

**Table 6.** CAAR of the total number of sample size of the methods for disclosing live stream marketing information.

Event windows	Sample size	CAAR (%)	t-value	p-value
[-5, 5]	11	2.016	2.478	0.033
[-10, 10]	21	3.480	6.989	0.000
[-15, 15]	31	3.342	8.234	0.000
[-30, -30]	61	2.263	13.218	0.000
[-30, -15]	16	1.459	5.301	0.000
[-15, 0]	16	2.184	5.392	0.000
[-30, 0]	31	3.376	8.746	0.000
[0, 15]	16	2.205	19.205	0.000
[15, 30]	16	-2.385	-8.585	0.000
[0, 30]	31	-0.067	9.612	0.000

4th day before the event and starts to rise on the first day before the event. The value is not greater than 0 until the third day after the event. It then climbs rapidly and reaches a high point of 3.19 percent on the 7th day after the event.

### 5.5. Classification of information disclosure method

Figure 5 shows that board secretary's reply to posts about live stream marketing on interactive platforms has a higher level of influence on the company's stock price than corporate announcements. The CAAR of reply to information is all greater than 0 within the event window. It displays an upward trend from the 30th day before the event to the 8th day after the event. The fastest rise occurs on the first day after the event. The value reaches a high point at 8.08 percent on the 8th day after the event and hits the highest value of 8.09 percent on the 27th day after the event. However, after a corporate announcement, the CAAR fluctuates more sharply than before the announcement. In the event window of [-30, 19], it fluctuates above 0. From the first day before the event to the third day after the event, the value increases dramatically. It reaches a high point at 3.25 percent on the third day after the event. Then it begins to decline and reaches the high value of 3.71 percent on the 11th day after the event.

## 6. Discussion

This study explored the influence of the live stream marketing on the stock price of China's listed companies by using the event methodology. The event was defined as the live stream marketing field where listed companies are involved, including those using live streamers for business and disclosing information on live stream marketing. The CAARs on the 30th, 15th, 10th, and 5th days before and after the event were calculated to determine whether the event had an influence on the stock price of listed companies. The results showed that the events occurred in the windows of [-30, 30], [-30, -15], [-30, 0], [0, 15], and [0, 30] had a significant and positive influence on the stock price. Although the events on the 5th day before and after the event date positively influenced the stock price, they did not pass the significance test. This means the influence of events on the stock price focused on the 30th and 15th days before and after the event date.

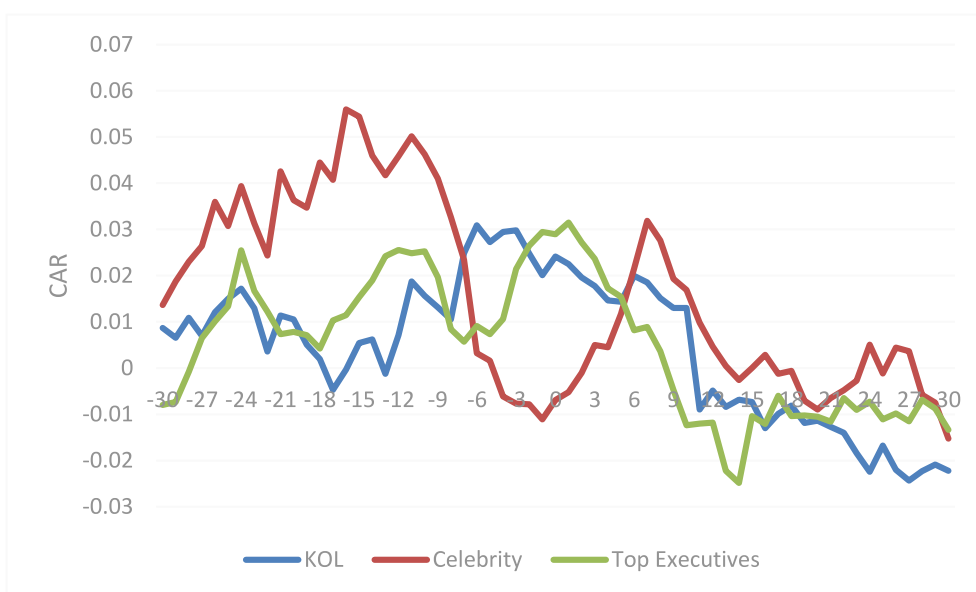
This study examines the impact of the live streaming events on stock prices. In addition to achieving an important contribution to the literature, this study provided an in-depth discussion of the live streaming events in Chinese listed companies. A growing interest among academics has been devoted to the consumer behavior aspect of the live streaming (Xu and Ye, 2020). The current study has initiated the discussion concerning the impact of the live streaming marketing events on a firm's stock price. Thus, by comparing the influence of different live streamers and information disclosure methods on stock prices, we examined the subsets of the live streamers and information disclosure methods and came to the discussions outlined below.

First, in terms of the overall live streamers, live stream marketing did have a positive influence on the stock price of listed companies and will become one of the main marketing channels in the Chinese market. The marketing model performed excellently during the COVID-19 period wherein live stream shopping will become a habitual consumer behavior (Shim et al., 2018). This result indicates that live streaming e-commerce is likely to become one of the important selling channels in the near future (Mao et al., 2022). For example, during COVID-19 pandemic, it encourages each citizen to purchase at home or a long time during the lockdown. Therefore, marketers are motivated to develop more behavioral implications of live stream commerce. The previous study confirmed that live streaming commerce was one of the most important selling channels during COVID-19 (Peng et al., 2021).

Second, live stream marketing events would have a positive influence on the stock price of listed companies before the event took place. In addition to live streaming commerce, the development of consumer

**Table 7.** CAAR of different live streamers in different event windows.

Event windows	KOLs			Celebrities			Top executives		
	CAAR (%)	t-value	p-value	CAAR (%)	t-value	p-value	CAAR (%)	t-value	p-value
[-5, 5]	-1.654	-5.293	0	0.849	-2.523	0.03	0.629	5.193	0
[-10, 10]	-0.576	0.88	0.39	-3.327	-10.121	0	-3.722	-3.881	0.001
[-15, 15]	-0.7	6.489	0	-5.593	-10.877	0	-2.18	-0.179	0.86
[-30, -30]	-2.222	2.355	0.022	-1.526	5.962	0	-1.337	2.677	0.01
[-30, -15]	0.544	5.317	0	5.44	11.681	0	1.534	3.869	0.002
[-15, 0]	2.442	7.224	0	-6.291	-5.398	0	1.75	3.586	0.003
[-30, 0]	2.412	7.506	0	-0.692	7.461	0	2.894	7.5	0
[0, 15]	-2.739	-3.355	0.004	1.113	6.653	0	-3.98	-5.417	0
[15, 30]	-1.537	-6.46	0	-1.27	-0.202	0.843	1.149	28.203	0
[0, 30]	-4.231	-7.834	0	-0.42	7.129	0	-4.28	-11.845	0



**Figure 4.** Comparison of CAARs of different live streamers.

**Table 8.** CAAR of different information disclosure methods in different event windows.

Event windows	Reply to information on interactive platforms			Corporate announcements		
	CAAR (%)	t-value	p-value	CAAR (%)	t-value	p-value
[-5, 5]	3.794	4.698	0.001	0.239	-0.931	0.374
[-10, 10]	5.784	7.453	0.000	1.175	1.863	0.077
[-15, 15]	5.253	9.377	0.000	1.432	1.466	0.153
[-30, -30]	6.590	11.117	0.000	-2.064	6.885	0.000
[-30, -15]	0.970	4.059	0.001	1.948	5.519	0.000
[-15, 0]	5.223	5.652	0.000	-0.856	-2.315	0.035
[-30, 0]	5.790	5.575	0.000	0.962	9.880	0.000
[0, 15]	1.464	12.648	0.000	2.947	10.680	0.000
[15, 30]	0.102	0.843	0.412	-4.871	-8.196	0.000
[0, 30]	2.234	17.975	0.000	-2.367	2.572	0.015

behavior, this study also finds that live streaming events have a positive impact on the stock price of companies. This is because listed companies would inform investors of the live streaming information in advance. As a result, there is a reaction of investors in the market that leads to trading (Obaidullah, 1992). The CAAR would reach a high point on the 7th day after the live streaming event when the 7-day unconditional return was

due. However, the CAAR became negative towards this, which means that live stream marketing events did not have a lasting influence on the stock price.

Third, publishing information on live stream marketing positively influenced the stock price of listed companies. Investor perceptions may influence the market reaction to published information (Madura and McDaniel, 1989). This study confirms, however, that there is a positive impact on the stock price of listed companies when information regarding live streaming marketing is published. Compared to such events, the disclosure of the live stream marketing information had a more significant and longer influence on the stock price. This is possible because listed companies published live streaming information more frequently than holding live streaming activities and thus causing a longer influence on the stock price.

Fourth, celebrity live streaming had the greatest influence on the stock price compared with KOLs and top executives, especially on the 30th and 15th days before the event. The CAAR of KOLs reached its peak on the 6th day before the event. This is probably because celebrities' followers would pay much attention to the live streaming of information about their idols in advance (Hu et al., 2017). Besides, the celebrities often have a special fan group to keep an eye on their updates. This makes it possible for the market to catch the information earlier. In terms of top executives, the CAAR reached the peak on the first day after the event. This means top executive live stream marketing positively influenced listed companies.



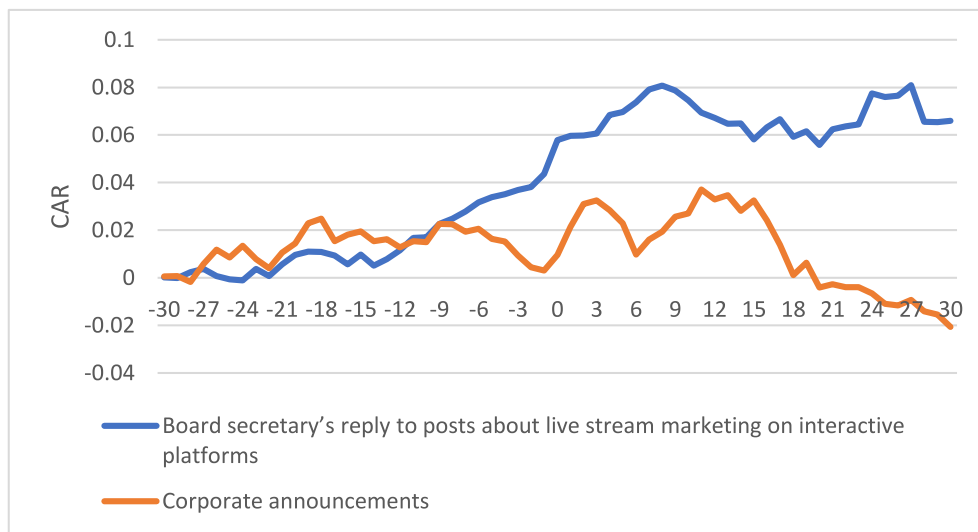


Figure 5. Comparison of CAARs of different information disclosure methods.

Fifth, corporate announcements positively influenced the stock price and the influence would last longer than that of the live stream marketing events. However, compared to corporate announcements, replies to information on interactive platforms had a more significant and longer influence on the stock price. Except for the event window of [15, 30], the CAAR was at a significance level in any other event window. The value remained positive even on the 30th day after the event and still showed an upward trend.

7. Conclusion

From the above discussions, this study came up with the following conclusions: (1) In the future, listed companies can properly use live stream marketing to sell their products. This may not only increase the sales but also have certain positive influences on the stock price. (2) To help the companies save certain marketing cost, listed companies can use top executive live stream marketing more than KOL live streaming as both have similar influence on the stock price. (3) Listed companies can cooperate with celebrities who are good at live stream marketing to help

raise the stock price, as celebrity live stream marketing has a higher level of influence on the stock price than other live streamers. (4) Listed companies should choose specific staff to post information on interactive platforms and reply to the questions from investors because posting information on live stream marketing has significant influence on the stock price. (5) Although live stream marketing has a positive influence on the stock price, the market has treated it in a much more rational way since some KOLs and celebrities failed in live stream marketing events. In addition, it costs a lot of money to hire a KOL or celebrity to participate in live streaming. Therefore, listed companies should treat live stream marketing events with good reason and not blindly adopt celebrity live stream marketing. The government should also treat the event rationally and not blindly follow other cities. They should handle it on a case-by-case basis and choose the development road that suits themselves.

7.1. Practical implication

Also, a practical conceptual framework, regarding why companies use live stream marketing to influence stock prices, which is illustrated in Figure 6 (The rationales that companies use live stream marketing to influence stock prices suggested by this study) and inferred by the authors through literature review results, has been summarized by this study. The causally influential framework from live stream marketing to the stock price is: (1) Live stream marketing can boost sales in a short amount of time. (2) The stock price is influenced by live stream marketing's dramatic sales. (3) Brand awareness, which helps forecast the stock price, is promoted.

8. Limitations and future studies

This study has three limitations. First, there are many listed companies involved in live stream marketing, but this study only chose those involved in Internet celebrity economy and then selected proper samples from these companies. Thus, this study may miss some companies. Besides, the number of samples in this study is too small. This means the computed results may have certain errors. Secondly, the classification of influential factors in this paper is not complete. This study only considered the types of the live streamers and information disclosure methods but did not take some other factors into account. Thirdly, this paper only selects the enterprises involved in Internet celebrity economy; thus, the results must be limited in terms of application and popularization.

Future studies can deepen the research from the following three aspects: First, increase the number of samples to validate and modify the results of this study; secondly, increase the categories of factors, such as

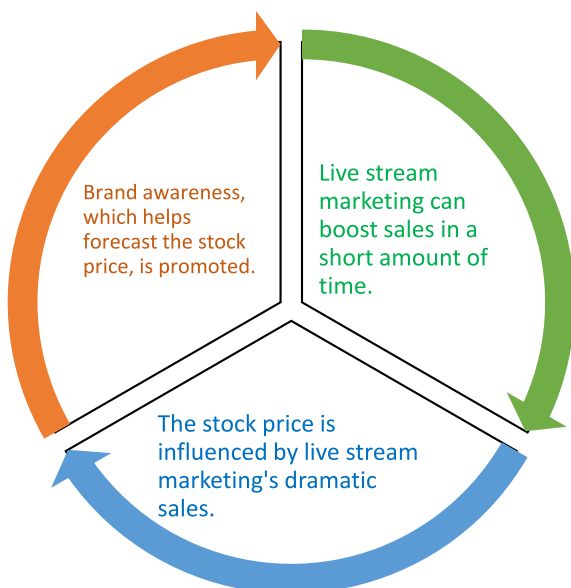


Figure 6. The rationales that companies use live stream marketing to influence stock prices suggested by this study.

head Internet celebrity, waist Internet celebrity and tail Internet celebrity, to compare the influence level of these factors on the stock price; third, consider whether the support of the municipal government affects the stock price of listed companies.

## Declarations

### Author contribution statement

Luo, Shunjun: Conceived and designed the analysis; Analyzed and interpreted the data; Contributed analysis tools or data; Wrote the paper.

Maw-Liann Shyu: Contributed analysis tools or data; Wrote the paper.

Andri Dayarana K. Silalahi: Contributed analysis tools or data; Wrote the paper.

I-Tung Shih: Analyzed and interpreted the data, Contributed analysis tools or data; Wrote the paper.

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### Data availability statement

Data will be made available on request.

### Declaration of interest's statement

The authors declare no conflict of interest.

### Additional information

No additional information is available for this paper.

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