# Influencers and firm value:
# Evidence from the Internet celebrity economy in China

Xiaohui Chen[a], Jangwook Lee[b,*], Sang-Joon Kim[b], Seung-Hee Kim[c], Paul Moon Sub Choi[b]

[a]*School of Business, Hanyang University, 222 Wangsimni-ro, Seongdong-gu, Seoul 04763, Korea*

[b]*College of Business Administration, Ewha Womans University, 52 Ewhayeodae-gil, Seodaemun-gu, Seoul 03760, Korea*

[c]*Business School, Sungkyunkwan University, 25-2 Sungkyunkwan-ro, Jongno-gu, Seoul 03063, Korea*

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[*] Chen (Ph.D. student) can be contacted at cxh980411@naver.com; School of Business, Hanyang University, 222 Wangsimni-ro, Seongdong-gu, Seoul 04763, Republic of Korea. Lee (Assistant Professor, corresponding author) can be contacted at jangwook.lee@ewha.ac.kr; College of Business Administration, Ewha Womans University, 52 Ewhayeodae-gil, Seodaemun-gu, Seoul 03760, Republic of Korea; tel.: +82-2-3277-2792. S.J. Kim (Associate Professor) can be contacted at s.kim@ewha.ac.kr; College of Business Administration, Ewha Womans University, 52 Ewhayeodae-gil, Seodaemun-gu, Seoul 03760, Republic of Korea; tel.: +82-2-3277-2654. S.-H. Kim (Ph.D. student) can be contacted at liebeai@g.skku.edu; Business School, Sungkyunkwan University, 25-2 Sungkyunkwan-ro, Jongno-gu, Seoul 03063, Republic of Korea; tel.: +82-10-2687-1231. Choi (Professor) can be contacted at paul.choi@ewha.ac.kr; College of Business Administration, Ewha Womans University, 52 Ewhayeodae-gil, Seodaemun-gu, Seoul 03760, Republic of Korea; tel.: +82-2-3277-3922. Special thanks are due to Robert Faff (the Editor) and anonymous referees. This research is based on the M.A. thesis of Chen approved at Ewha Womans University. Lee is grateful for the New Faculty Research Grant from Ewha Womans University. Standard disclaimer rules apply and all errors are our own.

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**Abstract**

As a rising socio-economic phenomenon in the advanced era of World Wide Web, the "Internet celebrity economy" (ICE) is a business model of capitalizing the online traffic based on the purchasing power of the users on the social media where the influential individuals, "influencers," wield their marketing clout to create a fandom. China has seen an abrupt outbreak in its "wanghong" economy (ICE) since 2016, eventually leading to consecutive upper-limit market closes for related stock listings from around 2020. The empirical findings of this research are as follows: First, investors' attention on wanghong stocks and the cumulative abnormal returns (CARs) are significantly positively associated. However, the numerical linkage between changes in operational results and the CAR is weak, implying the economic impact of "overheated" influencer marketing is short-lived and abnormal returns are an anomaly. Second, the positive abnormal returns of wanghong stocks last about 6 month which overlaps with the boom period of the wanghong index based on influencer new articles. The abnormal returns of wanghong listings during the bust period are, on average, statistically weakly negative.

Keywords: Internet celebrity economy; Influencer; Wanghong; Market anomaly; China

JEL Classification: G14, G15, L86

## 1. Introduction

*"Nothing influences people more than a recommendation from a trusted friend…"*[1]

Lately, the social media has an estimate of 3.8 billion global users accounting for nearly 50 percent of the entire human race (Kemp, 2020). In tandem with this trend, a single-person media market has rapidly expanded as seemingly average consumers on the Internet have increasingly become the suppliers of digital contents themselves (Ju and Cho, 2020). As a rising socio-economic phenomenon in the advanced era of World Wide Web, the "Internet celebrity economy" (ICE) is a business model of capitalizing the online traffic based on the purchasing power of the users on the social media where the influential individuals, "influencers," wield their marketing clout to create a fandom. China has seen an abrupt outbreak in its "wanghong" economy (ICE) since 2016, eventually leading to consecutive upper-limit market closes for related stock listings from around 2020.[2]

The influencers are a double-edged sword to firm value. Aligned with the firm's operational objectives and stakeholders' interests, they will not only boost the brand recognition of the company but also will catalyze the firm's talent recruiting and future growth prospect. The apparent downside is the risk of fake news and the influencers' own reputation, out of the firm's managerial control. In this regard, our study focuses on the recent market anomalies in China due to influencer marketing in the ICE era. This research will offer cautious implications to investors'

[1] Facebook founder and C.E.O. Mark Zuckerburg's quote (Story, 2007).

[2] For instance, on January 15, 2020, upon Shanghai New Culture Media Group's announcement of a "strategic cooperation agreement" with Li Jiaqi, an influencer based in China, its market capitalization had gained nearly RMB 2 billion over a week (Sina Finance, 2020). Likewise, Hunan Mengjie Home Textiles doubled its stock price over a 10-day window around its press release on May 11, 2020, regarding an influencer marketing accord with Weiya, another influencer (Golden Light, 2020).

speculative losses from their erroneous interpretation of market phenomena and will suggest some remedial measures to the capital market transition in the presence of data deluge (Mayer-Schönberger and Cukier, 2013).

As the Internet is the most important conduit for information propagation, news generated on the Internet attract augmented attention from the investors who already acquired useful resources from it. When an influencer agglomerates her fandom, it becomes a noteworthy news topic further reinforcing the clout of the influencer that might fuel the volatility of stocks in the wanghong economy. To date, these ebbs and flows observed in the stock market under the aura of influencers have not gained due academic attention. Naturally, we ask the following research questions regarding the wanghong market anomalies observed in China:

- Why do wanghong stocks show excess volatility?
- Are abnormal stock returns due to the influencers' intervention a stylized fact?
- Does influencers' marketing yield a long-run impact on firm value?
- Will wanghong stocks reach a steady state, long-run constant growth phase?

The primary measure of market anomalies in this study is the cumulative abnormal return (CAR) around event dates. The operational performance of the fandom-reaping, wanghong firm is a key explanatory variable along with other covariates of abnormal returns discussed in the literature. In order to identify the influencer effect on market anomalies, we test the statistical significance of short-run abnormal returns. Additionally, we divide the sample period to the wanghong boom and bust periods after detecting a noticeable regime shift in the wanghong stock index, and test the significance of long-run abnormal returns.

The empirical findings of this research are as follows: First, investors' attention on wanghong stocks and their CARs are significantly positively associated. However, the numerical

linkage between changes in operational results and CARs are weak, implying the economic impact of "overheated" influencer marketing is short-lived and abnormal returns are an anomaly. Second, the positive abnormal returns of wanghong stocks last about 6 month which overlaps with the boom period of the wanghong index based on influencer news articles. The abnormal returns of wanghong listings during the bust period are, on average, statistically weakly negative.

Section 2 reviews the related literature and presents the business model in the wanghong economy (ICE). Section 3 designs the research framework of this study for event study analytics, variable definitions, database description, identification of the empirical model, and presentation of preliminary results. Empirical analyses are performed are reported in Section 4 and we finally conclude in Section 5.

## 2. The internet celebrity economy

### *2.1. Two roles of internet celebrities in the stock market*

In the literature, the roles of internet celebrity for the stock market revolve around endorsements and evangelicalism (Ding et al., 2011; Fizel et al., 2008). First, celebrity endorsement unfolds by attracting customers' attention. In particular, celebrities bring credibility to the market, which makes consumers purchase the celebrity-endorsed products (Friedman and Friedman, 1979; García-Rapp and Roc-Cuberes, 2017; Geng et al., 2020; Kamins et al. 1989; ). As a result, the announcement related to celebrity endorsement can have a positive impact on stock prices (Agrawal and Kamakura, 1995; Farrell et al., 2000; Fizel et al., 2008).

Meanwhile, in a more active sense, internet celebrities, on their social media accounts, disseminate the information on products and services and recommend purchasing them (Chaney, 2001). This is another role of internet celebrity, called evangelicalism. While celebrity

endorsement reduces the uncertainty and risk related to products and services, celebrity evangelicalism sometimes actively changes others' behaviors. Internet celebrities provide information, through social media, advice to others, and exerts personal influence on others as an opinion leader (Case et al., 2004; Chaney, 2001). These social-media activities let their fans mimic their shopping patterns and take their perspectives and tastes (Weisfeld-Spolter and Thakkar, 2011).

*2.2. wanghong stocks and firm value*

In China, the two roles of internet celebrity are played by wanghongs. On social media, wanghongs attract millions of fandoms by providing timely and trendy information on fashion trends to their followers, reviewing fashion items, and offering shopping advice as fashionistas (Chang and Woo, 2019). These online activities enable their followers to make favorable attitude on the products and services in pro-actively (Zhang, 2017; Wang, 2018). Furthermore, as opinion leaders in fashion, books, restaurants, movies, and travel, wanghongs create original digital contents through live broadcasts, blogs, and Weibo on social media platforms. Through the information-sharing activities, they build up mutual trust with the viewers. This leads to a fandom, which makes, in turn, wanghongs continuously seek for media attention and exposure. As such, the online activities from wanghongs make their followers feel the quality of particular products guaranteed.

Wanghongs' online activities and their consequence are not only found on social media. With the endorsed information and evangelist-like activities, wanghongs can influence the behaviors of customers and investors. As internet celebrities, wanghongs endorse firm marketing activities, and the wanghong endorsement conveys a positive signal on the firm's products to the customers. Furthermore, by collaborating with firms for co-production of product advertisement, the (positive) reputation of wanghongs is projected on the product (McCracken, 1989; Knoll et al.,

2017). This image projection has a positive impact on sales revenues. As such, wanghongs' social influence helps firms increase sales and market shares (Gong and Li, 2017).

In response to the wanghongs' impact on sales, the stock market evaluates these firms more favorably. Investors predicting the incremental firm value due to wanghongs' activites are likely to draw the stock market's positive attention. These wanghong-endorsed stocks, "wanghong stocks," will upsurge, eventually leading to market anomalies (Zhang et al., 2018).

*2.3. The wanghong economy*

Internet celebrities are an artifact of digital transformation and a social phenomenon to capture the socially-embedded aspect of the information economy. Either as product endorsers or product evangelists, internet celebrities have been understood as social influencers. In China, wanghongs, as internet celebrities, enable firms to attract more attention from customers and investors. Further, super wanghongs, who possess a stratospheric level of influences on followers on social media, shape the market tastes and consumer behaviors thereby constructing the wanghong economy.

Given that wanghongs and firms collaborate with each other to build positive firm reputation as well as the products on social media, their interplay additionally wields social influences on the stock market. In other words, firms can create a new market with super wanghongs who can affect customers' tastes, enhancing sales revenues and expanding market shares and, further, emitting a amplifying signal to the stock market. As a consequence, investors increasingly pay attention to wanghong stocks, resulting in high returns.

Given this, we conjecture that a managerial attempt to reach out to a super wanghong's influence capacity will lead to stock anomalies in the short run with abnormal returns and a sharp

ascent in firm value. Yet, the stock price will eventually revert to the long run equilibrium. Figure 1 presents the dynamics of the economy driven by wanghongs.

[Insert Figure 1 about here.]

## 3. Research design

### *3.1. Event study*

In this study, we conduct event studies to examine the effect of wanghongs on firm value and identify the factors of the abnormal returns of wanghong stocks. We collect all news articles related to wanghong-related stocks listed on the Shanghai and Shenzhen Stock Exchanges, "the wanghong universe," from Baidu, Google, and Dongbang Financial Wealth Network during the sample period. We designate the initial appearance of a given company in the wanghong-thematic news press as the event date.

The market model is estimated through the period from 250 until 21 trading days prior to the event date. The abnormal return ($AR_{it}$) of firm $i$ on day $t$ is the difference of the firm's actual daily return ($R_{it}$) over the predicted daily return ($R_{mt}$) per market model, based on either Shanghai or Shenzhen index.

$$AR_{it} = R_{it} - R_{mt}. \quad (1)$$

In order to identify the Internet fever in the wanghong economy associated with a specific wanghong's influence (event), the average abnormal return (AAR) on the event date is estimated:

$$AAR_{it} = \frac{1}{N}\sum_{i=1}^{N} AR_{it}, \quad (2)$$

which is the sum of the abnormal returns of the entire cross-section of stocks in the wanghong universe. 5, 10, and 20 days preceding and following the event date determine the event

windows of the cumulative abnormal return (CAR), obtained as the cumulative sum of the abnormal returns through the event period:

$$CAR_{it}[\pm j] = \sum_{t=1}^{T} AR_{it}, \quad j = 5, 10, 20, \quad T = 2 \times j + 1, \tag{3}$$

where $T$ is the total number of days in the event window. Likewise, the "temperature-gauge" throughout the event window is the cross-sectional average of the CARs of the wanghong universe.

$$CAAR_{it} = \frac{1}{N} \sum_{i=1}^{N} CAR_{it}. \tag{4}$$

*3.2. Long-run analysis*

We study how the Internet fever affects the stock market by estimating the abnormal returns of wanghong stocks. We categorize the fever period with the number of wanghong-related news articles into two sub-periods (Figure 2). Accordingly, the sample period is divided into the influencer-network-boom period from December 24, 2019, until June 20, 2020, and the influencer-network-burst period from June 21, 2020, and beyond.

[Insert Figure 2 about here.]

Following Barber and Lyon (1997), the buy-and-hold abnormal returns (BHARs) of wanghong stocks are used to capture market anomalies in the long run in this study. As it appears that the period of "overheated" influencer effect on the wanghong economy is approximately six months from December 2019 until June 2020 (Figure 2), we measure the BHAR of a wanghong stock from the identified event date ($\tau$) over 12 months ($t = \tau, \cdots, T$) using monthly returns. The market model is estimated through the 8 months preceding the event date:

$$BHAR_{i\tau} = \prod_{t=\tau}^{T}(1 + R_{it}) - \prod_{t=\tau}^{T}(1 + R_{mt}), \tag{5}$$

where $R_{it}$ is the monthly return of firm $i$ in month $t$, and $R_{mt}$ is the predicted return per benchmark index return, considering the reinvestment of dividends on the market portfolio, either Shanghai or Shenzhen. We will observe how abnormal returns vary during the wanghong

economic boom period based on the time series of BHARs. We ask the following questions: How does the abnormal return evolve after the wanghong boom period? Are abnormal returns positive? Do they turn into negative due to the overreaction? Alternatively, do the stock prices revert to the pre-event level?

*3.3. Explanatory and control variables, and the empirical model*

We survey the literature to identify the co-variates in the regression model. Da et al. (2011) suggested Internet users' search volume for a given stock-related news as a direct measure of retail investors' attention. For a given wanghong stock, we use the daily search volume on Baidu as the investor attention measure ($Attention$), whose daily observations are averaged through the estimation period from 250 until 21 trading days prior to the event date to predict investor attention through the event window,

$$PA = \frac{1}{230} \sum_{t=-250}^{-21} Attention_t, \quad (6)$$

as opposed to actual investor attention,

$$AA = \frac{1}{T} \sum_{t=-j}^{j} Attention_t, \quad j = 5, 10, 20, \quad T = 2 \times j + 1. \quad (7)$$

Our measure of abnormal attention ($InvestorConcern$) is a relative degree of actual investor attention (AA) in excess of predicted investor attention ($PA$) as follows:

$$InvestorConcern_{it}[\pm j] = \frac{AA-PA}{PA}, \quad j = 5, 10, 20,$$

which assesses the abnormal change of investor attention through the event window for firm $i$ on event day $t$.

For the control variables, the growth rate of operating income to proxy for business performance ($Growth$). Following Ryu and Jeon (2021), $Volume$ is the natural logarithm of the trading volume of the listed company. $Size$ the natural logarithm of the market capitalization of a firm. $TobinQ$ is the ratio of the stock price over the net assets, proxying for the firm's growth

potential (Tobin, 1969). The book-to-market ratio is the book value divided by the market capitalization ($BookMarket$). The wanghong effect on firm value can be associated with the return on assets ($ROA$), the net income divided by the total assets. The total debt-to-asset ratio is the ratio of total liabilities divided by total assets, measuring the financial soundness of a company ($DebtAsset$s). $Earnings$ is a dummy variable equal to one if the event date is three days before or after the yearly or quarterly earnings announcement, or zero otherwise.

The following regression model identifies the channel from investor concern, operating performance, and the control variables to the abnormal returns of wanghong stocks:

$$CAR = \alpha + \beta \{InvestorConcern \cup Growth\} + \text{Controls} + \epsilon. \quad (5)$$

*3.4. Data and the preliminary results*

The original sample is the "Wanghong Economic Concept"-designated companies listed on the Shanghai and Shenzhen Stock Exchanges. Among them, the "de-listing risk" firms with net losses of three consecutive years are excluded. 100 event dates are counted for wanghong stocks belong to the media, textiles, clothing, food and beverages, and commercial industries. The media industry accounts for nearly 50% of our wanghong sample companies. The return and trading volume observations of listed stocks, the Shanghai Composite Index, the Shenzhen Composite Index from January 2, 2018, to March 18, 2022, are retrieved from the Wind database with 98,947 firm-day observations. The accounting variables, such as operating income, book value, total assets, etc., are obtained from the China Research Data Services platform. The Baidu search index and the press release index are algorithmically collected from the Internet.

[Insert Table 1 about here.]

Table 1 reports the descriptive statistics. The CAR estimates over 11 ($[\pm 5]$), 21 ($[\pm 10]$) and 41 ($[\pm 20]$)-day event windows are all positive, implying that influencer-associated stocks, overall,

outperform the market-implied returns around the event dates. Likewise, Investors' attention measures ($InvestorConcern$) are all positive. However, the operating income growth of wanghong stocks is, on average, negative, suggesting the hubris of the wanghong effect. Partnering wanghongs is prohibitively costly. Over the longest window, the range of the CAR is 189.17%p, indicating that the wanghong effect may be unreliable and case specific.

## 4. Main results

As the number of firms in this study is 100 from 2019 until 2021 with an unbalanced panel dataset, we adopt the mixed effect model to implement regression analysis. In Table 2, the CAR is regressed onto investors' attention controlling for trading volume, firm size, Tobin's Q, the book-to-market ratio, the return on assets, the debt-to-assets ratio, and the earnings announcement dummy variable. For the shortest window over 11 days ( $[\pm 5]$ ), investors' attention ($InvestorConcern5$) is not vividly associated with wanghongs' wealth effect (Models 1, 4, and 7). Delayed propagation of news and market inefficiency might contribute to the statistical insignificances.

[Insert Table 2 about here.]

However, as the recognition escalates over 21 ($[\pm 10]$) and 41 ($[\pm 20]$) days, the wanghong effect on the shareholder value is statistically and economically conspicuous (Models 2, 5, and 7; Models 3, 6, and 9, respectively). The firm leverage ($DebtAssets$) appears to be positively associated with the wanghong effect over 11 and 21 days around the event dates possibly due to overbudgeted marketing expenses. As the variance inflation factors (VIFs) of all explanatory variables are all below 10, the panel regression results appear free from multi-collinearity.

[Insert Table 3 about here.]

Whether the operational performance of the company ($Growth$) is associated with the event study abnormal returns of wanghong stocks is unanswered in Table 3 as the coefficient estimates are insignificantly negative in ordinary least squares (OLS; Models 1, 3, and 5) or robustness regression (Models 2, 4, and 6) over 11 ($[\pm 5]$), 21 ($[\pm 10]$) and 41 ($[\pm 21]$)-day event windows (Models 1 and 2, Models 3 and 4, and Models 5 and 6, respectively). Again, the wanghongs' wealth effect is significantly associated with the firm leverage ($DebtAssets$) up to 21 days around the event dates. We find that the seemingly flamboyant, and costly, influencer effect on the stock market is not rooted in the firms' operational activities. In other words, the investors are not attracted to wanghong stocks due to these firms' business performances.

[Insert Table 4 about here.]

Continuing our investigation, we further categorize the operational performance of wanghong-affiliated firms with the following proxies:

- $Growth1$. Subtract the most recent quarterly operating income preceding the event date from the quarterly operating income announced in six months—the approximate boom-burst period of the wanghong hype (Figure 2). Divide the difference by the last quarterly operating income released prior to the event date.
- $Growth2$. Estimate the change in operating income through the wanghong bubble period from December 2019 until June 2020 (Figure 2) and divide the change by the quarterly operating income as of December 2019.

Likewise, the operational impact on the wanghong effect (event study return) is insignificantly negative. In other words, investors' positive reactions to influencer-related news releases are unrelated with the wanghong-tied companies' operational performances (Table 4).

[Insert Table 5 about here.]

In order to witness whether an influencer-related news release of a single stock wields an overall impact on the whole wanghong universe, the cross-sectional average of abnormal returns is tested for significance. In Panel A of Table 5, the AARs for all wanghong-media events through the 41-day window ($[\pm 21]$) are presented. On a daily basis, we find the abnormal return is statistically and economically meaningful throughout the wanghong universe in the last four-consecutive days including the event day. However, other than that specific time span, the abnormal return is mostly negative with some statistical significances, suggesting that investors' systematic co-movement driven by wanghong sentiment is noticeable but short-lived. In Panel B of Table 5, the CAARs through the 11 ($[\pm 5]$), 21 ($[\pm 10]$) and 41-day event widows are provided. Cumulatively, the universe-wide economic impact of a single firm's wanghong-related press announcement is statistically vivid across all event periods.

As the boom-burst cycle of the wanghong fever last approximately six months (Figure 2), we continue to investigate the long-run effect of a wanghong media event in the section. The BHARs are estimated and averaged across the wanhong universe and plotted in Figure 3. Positive abnormal returns are seen in the first six months during the sample period which overlaps with the "wanghong fever" era. Likewise, the monthly BHAR estimates are significantly positive December 2019 through May 2020 as tabulated in Table 6.

[Insert Figure 3 about here.]

[Insert Table 6 about here.]

## 5. Conclusion

We live in an era where all firms, regardless of operations on-line and off-line, and all individuals must pay grave attention to the traffic on the Internet. Not so long ago, all Internet-

based firms considered the traffic as the foremost critical factor upon launching of a new product. The technologies of top messenger services, like Kakao Talk and WeChat, may be replicable, but not their generated traffic. Even those businesses based on off-line transactions are obliged to keep track of the on-line traffic. The wanghong economy earlier took off with some corporations marketing their handful brands exploiting the Internet traffic of influencers. Since then, this value creation mechanism has risen as a new volatility factor of the stock market as wanghongs' societal clout magnified.

This study analyzed a noticeable pattern in the capital markets with respect to wanghong events and induced meaningful results. First, there is a conspicuously positive association between investors' attention and the event-study abnormal returns of "wanghong economy"-branded firms upon announcement of influencer-related news. The Internet fever stoked by wanghongs is the rudiments of this market phenomenon. Second, operational performances are not related with the influencer effect on the abnormal returns of wanghong stocks, suggesting that the short-lived market anomaly is an outcome of over-disbursed marketing expenses. Third, the BHAR averaged across the wanghong universe is statistically significant December 2019 through May 2020 which coincides with the wanghong boom period according to news counts.

As the most imperative practical implication of this study, since the clout of Internet influencers is ubiquitous and extensive, firms can strategically partner with them to exploit the on-line traffic for its capital raising objectives. Further investigations are left to the future studies of readers' and our own.

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## Table 1. Preliminary estimation results

CAR is calculated as the cumulative sum of the abnormal returns in different time windows, such as [-5,+5], [-10,+10], and [-20,+20] (in days). The abnormal return is defined as the difference of the firm's actual daily return over the predicted daily return per market model, based on either Shanghai or Shenzhen index. InvestorConcern, which refers to the abnormal attention of investors, is measured as a relative degree of actual investor attention (AA) in excess of predicted investor attention (PA). The attention is captured as the search volume for a given stock-related news on a social media platform (i.e. Baidu), by using the corresponding time windows to those of CAR, i.e. [-5,+5], [-10,+10], and [-20,+20] (in days). Growth is defined as the growth rate of operating incomes.

| Variable | No. of obs. | Mean | Median | St. dev. | Minimum | Maximum |
|---|---|---|---|---|---|---|
| CAR[-5,+5] | 100 | 0.107 | 0.076 | 0.175 | -0.236 | 0.761 |
| CAR[-10,+10] | 100 | 0.128 | 0.069 | 0.244 | -0.308 | 1.123 |
| CAR[-20,+20] | 100 | 0.111 | 0.032 | 0.279 | -0.323 | 1.569 |
| InvestorConcern[-5,+5] | 97 | 1.479 | 0.641 | 2.935 | -0.468 | 26.540 |
| InvestorConcern[-10,+10] | 97 | 1.393 | 0.727 | 2.776 | -0.445 | 24.890 |
| InvestorConcern[-20,+20] | 97 | 1.270 | 0.665 | 2.600 | -0.432 | 22.530 |
| Growth | 100 | -0.021 | -0.060 | 0.370 | -0.753 | 1.033 |

## Table 2. Panel regressions of the cumulative abnormal return

As the dependent variable, CAR is calculated as the cumulative sum of the abnormal returns in different time windows, such as [-5,+5], [-10,+10], and [-20,+20] (in days). The abnormal return is defined as the difference of the firm's actual daily return over the predicted daily return per market model, based on either Shanghai or Shenzhen index. The independent variables are as follows: InvestorConcern, which refers to the abnormal attention of investors, is measured as a relative degree of actual investor attention (AA) in excess of predicted investor attention (PA). The attention is captured as the search volume for a given stock-related news on a social media platform (i.e. Baidu) in the different time windows, i.e. [-5,+5], [-10,+10], and [-20,+20] (in days). Volume is the natural logarithm of the trading volume of the listed company. Size is measured with the natural logarithm of the market capitalization of a firm. TobinQ is the ratio of the stock price over the net assets. BookMarket is computed as the book value divided by the market capitalization. ROA is the net income divided by the total assets. DebtAssets is calculated as the ratio of total liabilities divided by total assets. Earnings is a dummy variable equal to one if the event date is three days before or after the yearly or quarterly earnings announcement, or zero otherwise. The t-statistic is below the coefficient estimate. *** p<0.01, ** p<0.05, * p<0.1

| Variable | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 | Model 7 | Model 8 | Model 9 | VIF |
|---|---|---|---|---|---|---|---|---|---|---|
| InvestorConcern5 | -0.142 | | | -0.606 | | | -0.159 | | | 1.070 |
| | (0.625) | | | (0.862) | | | (1.017) | | | |
| InvestorConcern10 | | 1.658** | | | 2.386** | | | 1.996* | | 1.150 |
| | | (0.661) | | | (0.911) | | | (1.093) | | |
| InvestorConcern20 | | | 1.951*** | | | 2.903*** | | | 2.551** | 1.130 |
| | | | (0.696) | | | (0.955) | | | (1.150) | |
| Volume | -0.733 | -1.033 | -0.810 | -0.434 | -0.860 | -0.542 | 2.860 | 2.498 | 2.759 | 1.390 |
| | (1.575) | (1.527) | (1.510) | (2.171) | (2.104) | (2.071) | (2.563) | (2.524) | (2.495) | |
| Size | -3.650 | -4.991** | -5.248** | -5.127 | -6.813** | -7.267** | -4.108 | -5.729 | -6.214 | 1.610 |
| | (2.524) | (2.478) | (2.466) | (3.479) | (3.413) | (3.383) | (4.106) | (4.095) | (4.074) | |
| TobinQ | 0.377 | 0.322 | 0.375 | 1.035 | 0.903 | 0.981 | 1.144 | 1.079 | 1.145 | 1.830 |
| | (0.625) | (0.599) | (0.594) | (0.862) | (0.825) | (0.815) | (1.017) | (0.990) | (0.981) | |
| BookMarket | -10.940 | -13.670 | -13.340 | -20.350 | -25.35** | -24.98** | -17.830 | -21.080 | -20.900 | 1.810 |
| | (9.519) | (9.108) | (9.014) | (13.120) | (12.550) | (12.360) | (15.490) | (15.050) | (14.890) | |
| ROA | -0.176 | -0.020 | -0.006 | -0.135 | 0.081 | 0.109 | 0.252 | 0.440 | 0.475 | 1.270 |
| | (0.290) | (0.287) | (0.284) | 0.399) | (0.395) | (0.390) | (0.471) | (0.474) | (0.470) | |
| DebtAssets | 0.244** | 0.256** | 0.242** | 0.265* | 0.290* | 0.270* | 0.165 | 0.180 | 0.163 | 1.210 |
| | (0.111) | (0.107) | (0.106) | (0.153) | (0.147) | (0.145) | (0.181) | (0.176) | (0.175) | |
| Earnings | 3.537 | 3.827 | 3.956 | 0.888 | 1.617 | 1.817 | 1.891 | 2.231 | 2.418 | 1.110 |
| | (6.406) | (6.174) | (6.124) | (8.830) | (8.505) | (8.400) | (10.420) | (10.200) | (10.120) | |
| Constant | 102.5** | 136.3*** | 138.3*** | 136.5* | 179.6** | 184.3*** | 57.270 | 98.180 | 104.500 | |
| | (50.370) | (50.020) | (49.420) | (69.420) | (68.900) | (67.790) | (81.940) | (82.670) | (81.650) | |
| CAR[-5,+5] | Yes | Yes | Yes | | | | | | | |
| CAR[-10,+10] | | | | Yes | Yes | Yes | | | | |
| CAR[-20,+20] | | | | | | | Yes | Yes | Yes | |
| Observations | 97 | 97 | 97 | 97 | 97 | 97 | 97 | 97 | 97 | |
| F-test | 1.58 | 2.47** | 2.69** | 1.83 * | 2.75*** | 3.09*** | 0.89 | 1.34 | 1.55 | |
| R-squared | 0.125 | 0.183 | 0.197 | 0.142 | 0.2 | 0.22 | 0.075 | 0.108 | 0.124 | |

## Table 3. Operational performances and the cumulative abnormal return

As the dependent variable, CAR is calculated as the cumulative sum of the abnormal returns in different time windows, such as [-5,+5], [-10,+10], and [-20,+20] (in days). The abnormal return is defined as the difference of the firm's actual daily return over the predicted daily return per market model, based on either Shanghai or Shenzhen index. The independent variables are as follows: Growth is defined as the growth rate of operating incomes. Volume is the natural logarithm of the trading volume of the listed company. Size is measured with the natural logarithm of the market capitalization of a firm. TobinQ is the ratio of the stock price over the net assets. BookMarket is computed as the book value divided by the market capitalization. ROA is the net income divided by the total assets. DebtAssets is calculated as the ratio of total liabilities divided by total assets. Earnings is a dummy variable equal to one if the event date is three days before or after the yearly or quarterly earnings announcement, or zero otherwise. The t-statistic is below the coefficient estimate. *** p<0.01, ** p<0.05, * p<0.1

| Variable | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 | VIF |
|---|---|---|---|---|---|---|---|
| Growth | -0.037 | -0.037 | -0.011 | -0.011 | -0.036 | -0.036 | 1.070 |
| | (0.055) | (0.043) | (0.076) | (0.065) | (0.090) | (0.081) | |
| Volume | -0.660 | -0.660 | -0.296 | -0.296 | 3.005 | 3.005 | 1.390 |
| | (1.451) | (1.343) | (2.013) | (2.427) | (2.377) | (2.810) | |
| Size | -3.465 | -3.465** | -5.028 | -5.028** | -3.496 | -3.496 | 1.610 |
| | (2.408) | (1.488) | (3.341) | (2.428) | (3.945) | (2.924) | |
| TobinQ | 0.420 | 0.420 | 1.047 | 1.047 | 1.023 | 1.023 | 1.830 |
| | (0.606) | (0.459) | (0.842) | (0.691) | (0.994) | (0.624) | |
| BookMarket | -12.770 | -12.77* | -22.28* | -22.28* | -20.510 | -20.510 | 1.810 |
| | (9.327) | (7.437) | (12.940) | (11.950) | (15.280) | (13.580) | |
| ROA | -0.119 | -0.119 | -0.080 | -0.080 | 0.206 | 0.206 | 1.270 |
| | (0.287) | (0.205) | (0.398) | (0.258) | (0.471) | (0.332) | |
| DebtAssets | 0.267** | 0.267** | 0.275* | 0.275* | 0.206 | 0.206 | 1.210 |
| | (0.111) | (0.117) | (0.154) | (0.144) | (0.182) | (0.165) | |
| Earnings | 4.194 | 4.194 | 1.324 | 1.324 | 2.808 | 2.808 | 1.110 |
| | (6.316) | (4.653) | (8.764) | (5.907) | (10.350) | (8.065) | |
| Constant | 96.65** | 96.65** | 131.7* | 131.7** | 40.820 | 40.820 | |
| | (48.450) | (36.860) | (67.230) | (65.560) | (79.380) | (78.720) | |
| CAR[-5,+5] | Yes | Yes | | | | | |
| CAR[-10,+10] | | | Yes | Yes | | | |
| CAR[-20,+20] | | | | | Yes | Yes | |
| OLS | Yes | | Yes | | Yes | | |
| Robust regression | | Yes | | Yes | | Yes | |
| Observations | 100 | 100 | 100 | 100 | 100 | 100 | |
| R-squared | 0.13 | 0.13 | 0.14 | 0.14 | 0.077 | 0.077 | |

## Table 4. Operational performances with two phases and the cumulative abnormal return

As the dependent variable, CAR is calculated as the cumulative sum of the abnormal returns in different event windows, such as [-5,+5], [-10,+10], and [-20,+20] (in days). The abnormal return is defined as the difference of the firm's actual daily return over the predicted daily return per market model, based on either Shanghai or Shenzhen index. The independent variables are as follows: Growth1 is calculated by subtracting the most recent quarterly operating income preceding the event date from the quarterly operating income announced in six months and then dividing the difference by the last quarterly operating income released prior to the event date. Growth2 is obtained by estimating the change in operating income through the wanghong bubble period from December 2019 until June 2020 and dividing the change by the quarterly operating income as of December 2019. Volume is the natural logarithm of the trading volume of the listed company. Size is measured with the natural logarithm of the market capitalization of a firm. TobinQ is the ratio of the stock price over the net assets. BookMarket is computed as the book value divided by the market capitalization. ROA is the net income divided by the total assets. DebtAssets is calculated as the ratio of total liabilities divided by total assets. Earnings is a dummy variable equal to one if the event date is three days before or after the yearly or quarterly earnings announcement, or zero otherwise. The t-statistic is below the coefficient estimate. *** p<0.01, ** p<0.05, * p<0.1

| Variable | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 |
|---|---|---|---|---|---|---|
| Growth1 | -0.725 | | -0.755 | | -1.030 | |
| | (0.806) | | (1.118) | | (1.320) | |
| Growth2 | | -0.347 | | -1.056 | | -0.259 |
| | | (1.661) | | (1.195) | | (1.963) |
| Volume | -0.639 | -0.338 | -0.290 | -0.787 | 3.026 | 2.991 |
| | (1.447) | (2.026) | (2.007) | (1.458) | (2.370) | (2.394) |
| Size | -3.913 | -5.154 | -5.363 | -3.860 | -4.052 | -3.723 |
| | (2.408) | (3.339) | (3.340) | (2.402) | (3.943) | (3.946) |
| TobinQ | 0.397 | 1.029 | 1.066 | 0.359 | 1.016 | 0.966 |
| | (0.601) | (0.833) | (0.833) | (0.600) | (0.984) | (0.985) |
| BookMarket | -11.050 | -21.90* | -21.45* | -11.530 | -18.640 | -19.250 |
| | (9.123) | (12.670) | (12.650) | (9.113) | (14.940) | (14.970) |
| ROA | -0.176 | -0.110 | -0.099 | -0.214 | 0.149 | 0.143 |
| | (0.275) | (0.388) | (0.382) | (0.279) | (0.451) | (0.459) |
| DebtAssets | 0.267** | 0.274* | 0.290* | 0.261** | 0.216 | 0.190 |
| | (0.109) | (0.150) | (0.151) | (0.108) | (0.179) | (0.177) |
| Earnings | 2.444 | 1.062 | -0.052 | 3.353 | 0.591 | 2.159 |
| | (6.370) | (8.684) | (8.834) | (6.248) | (10.430) | (10.260) |
| Constant | 106.5** | 136.3** | 139.0** | 110.8** | 53.020 | 47.290 |
| | (48.410) | (68.560) | (67.140) | (49.330) | (79.280) | (81.030) |
| CAR[-5,+5] | Yes | Yes | | | | |
| CAR[-10,+10] | | | Yes | Yes | | |
| CAR[-20,+20] | | | | | Yes | Yes |
| Observations | 100 | 100 | 100 | 100 | 100 | 100 |
| R-squared | 0.133 | 0.14 | 0.144 | 0.133 | 0.081 | 0.075 |

## Table 5. Average abnormal returns

The average abnormal return (AAR) of a stock listing is the sum of the abnormal returns of the entire cross-section of stocks in the wanghong universe through the 41-day window (i.e. [-20,+20]). The cumulative average abnormal return (CAAR) of a stock listing is the cross-sectional average of the CARs of the wanghong universe throughout the event windows, such as [-5,+5], [-10,+10], and [-20,+20]. The t-statistic is below the coefficient estimate. The t-statistic is below the coefficient estimate. *** p<0.01, ** p<0.05, * p<0.1

**Panel A. Average abnormal return (AAR)**

| Day | AAR | *t*-statistic | Day | AAR | *t*-statistic |
|---|---|---|---|---|---|
| -20 | 0.275 | 0.773 | 1 | 0.357 | 0.837 |
| -19 | -0.109 | -0.326 | 2 | 0.129 | 0.259 |
| -18 | -0.432 | -1.423 | 3 | -0.258 | -0.525 |
| -17 | 0.205 | 0.738 | 4 | 1.512 | 3.388*** |
| -16 | 0.962 | 3.331*** | 5 | -0.460 | -1.055 |
| -15 | -0.054 | -0.244 | 6 | -0.332 | -0.818 |
| -14 | 0.165 | 0.720 | 7 | -0.565 | -1.591 |
| -13 | 0.291 | 1.960* | 8 | 0.281 | 0.878 |
| -12 | 0.407 | 1.456 | 9 | 0.378 | 0.987 |
| -11 | 0.076 | 0.241 | 10 | 0.333 | 0.794 |
| -10 | 0.502 | 1.606 | 11 | 0.021 | 0.056 |
| -9 | -0.340 | -1.082 | 12 | -0.952 | -2.410** |
| -8 | 1.165 | 3.464*** | 13 | 0.443 | 1.034 |
| -7 | 0.411 | 1.212 | 14 | -0.570 | -1.426 |
| -6 | -0.025 | -0.074 | 15 | -1.546 | -4.049*** |
| -5 | 0.211 | 0.667 | 16 | -0.342 | -0.831 |
| -4 | 0.571 | 1.290 | 17 | -0.266 | -0.608 |
| -3 | 1.563 | 4.418*** | 18 | -0.264 | -0.740 |
| -2 | 1.347 | 3.150*** | 19 | -0.572 | -1.516 |
| -1 | 2.197 | 4.680*** | 20 | 0.775 | 2.725*** |
| 0 | 3.562 | 6.337*** | | | |

**Panel B. Cumulative average abnormal return (CAARs)**

| Window | CAAR | *t*-statistic |
|---|---|---|
| [-5, 5] | 10.707 | 6.114*** |
| [-10,10] | 12.750 | 5.217*** |
| [-20, 20] | 11.046 | 3.965*** |

## Table 6. Buy-and-hold abnormal return

The buy and hold abnormal return (BHAR) of a stock listing is calculated as the mean compounded abnormal return from the event date over 12 months using monthly returns. The t-statistic is below the coefficient estimate. *** p<0.01, ** p<0.05, * p<0.1

| Date | No. of obs. | Mean | St. err. | St. dev | 95% confidence interval | | *t*-statistic |
|---|---|---|---|---|---|---|---|
| Dec. 2019 | 100 | 0.114 | 0.033 | 0.329 | [0.049 | 0.180] | 3.481*** |
| Jan. 2020 | 100 | 0.129 | 0.040 | 0.397 | [0.050 | 0.208] | 3.252*** |
| Feb. 2020 | 100 | 0.070 | 0.034 | 0.336 | [0.004 | 0.137] | 2.092** |
| Mar. 2020 | 100 | 0.063 | 0.037 | 0.367 | [-0.010 | 0.135] | 1.701* |
| Apr. 2020 | 100 | 0.078 | 0.039 | 0.391 | [0.000 | 0.155] | 1.993** |
| May. 2020 | 100 | 0.094 | 0.047 | 0.467 | [0.001 | 0.186] | 2.003** |
| Jun. 2020 | 100 | 0.047 | 0.054 | 0.537 | [-0.060 | 0.153] | 0.872 |
| Jul. 2020 | 100 | -0.017 | 0.049 | 0.485 | [-0.113 | 0.079] | -0.354 |
| Aug. 2020 | 100 | -0.055 | 0.055 | 0.546 | [-0.163 | 0.053] | -1.005 |
| Sep. 2020 | 100 | -0.042 | 0.060 | 0.601 | [-0.161 | 0.078] | -0.694 |
| Oct. 2020 | 100 | -0.060 | 0.081 | 0.812 | [-0.221 | 0.101] | -0.739 |
| Nov. 2020 | 100 | -0.087 | 0.098 | 0.983 | [-0.282 | 0.108] | -0.882 |

**Figure 1. The Internet celebrity economy**

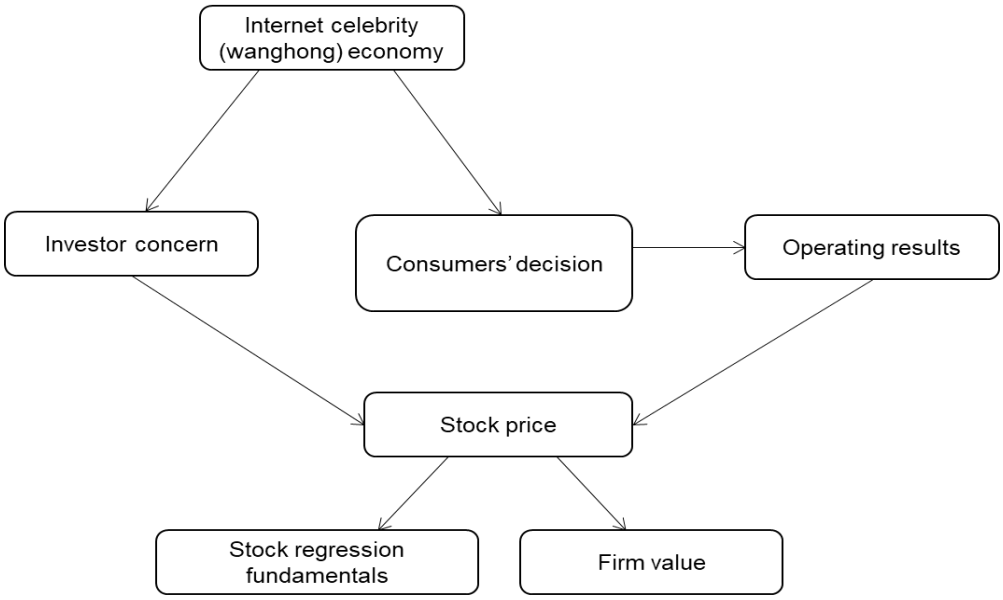

**Figure 2. Wanghong stock news count**

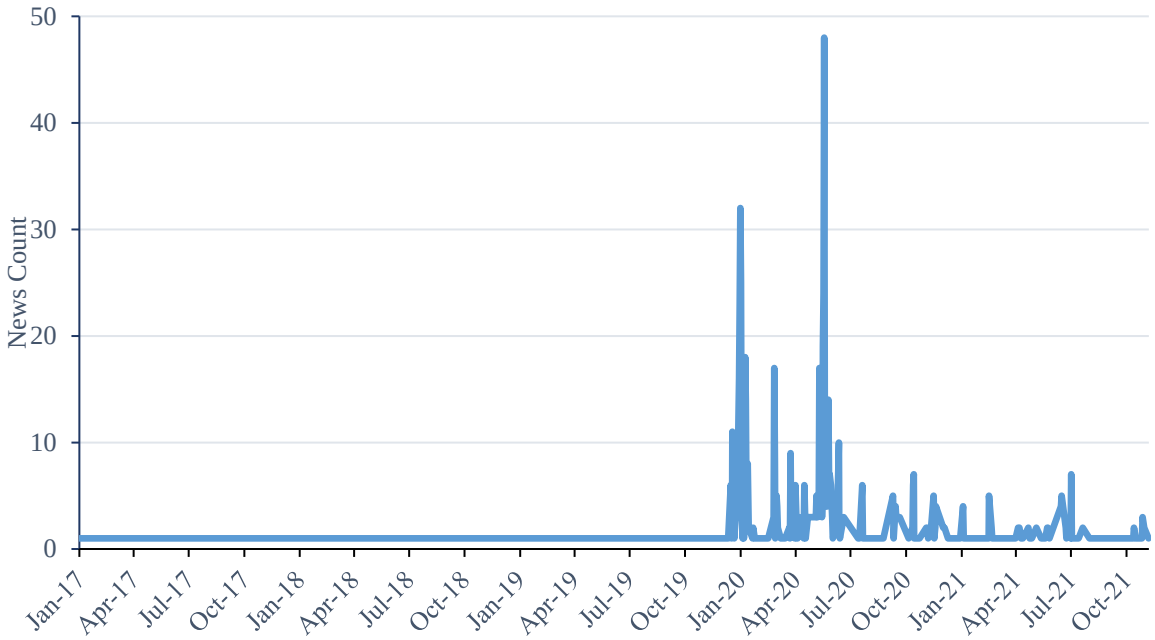

**Figure 3. Buy-and-hold abnormal return**