

# Gossip on Stock Return: Evidence from China

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**Abstract.** Based on the investor attention theory, non-fundamental related information could lead to influences on the stock market as well. This study is aiming to detect the possible effect from gossip on stock return. By focusing on the specific information's impact on the company's stock return, it takes a Chinese company JD as the research objective and the gossip news about the company's CEO as the information source. The investor attention is measured by Google searching volume index. The results from the empirical tests show that the gossip does have significant effects on stock return during a short period. For the longer period, the effects are likely to become insignificant and eliminated themselves. The reason for the stock price drift is related to the increased investor attention by link the Google searching index and the price fluctuation together. Based on the situation from the year of 2015 to 2016 of JD Company, the empirical research shows robust support for the argument.

**Keywords:** Investor attention theory; Gossip; Stock return; Price drift; Investor behavior.

## 1. Introduction

Among the various types of information, gossip is a special approach of gaining information about the individuals or groups. Gossip always has the character of quick and wildly spread and its existence is common in most societies and cultures comparing to the other information (Baumeister et al., 2004). Based on the psychological theories, the functions of gossip are often considered as a tool to transfer information with a higher speed. The speculation that whether the leadership of the company could use their gossip for reach some purpose always exists. Under the assumption that gossip could give an impact on the company's stock return, the cause-and-effect relationship between these special information and company's stock return could be investigated in depth for further implications.

The investigate object is JD Company, and the founder is a famous businessman named Qiangdong Liu. The gossip news about Liu is mainly about his relationship with his wife Zhang, an internet celebrity. The empirical analysis begins by testing if the gossip could generate abnormal return around the date of news publication. Then the results are linked to the degree of investor attention. The measurement for the investor attention is following the previous study of Da et al. (2011) by using the Google searching index that presented by SVI. As it can capture worldwide information for the searching action, the investor attention presented by SVI could considered relatively reliable (Goddard et al., 2015).

On the theoretical basis, the early suggestion from previous research have implied that the investor psychological biases due to the limited attention could be a reason for the price fluctuations in stock market (Daniel et al., 2002). Especially with the rapid development of internet, it has provided an easier source for seeking information during the past decade, which also provide a way to influence the stock market through the quicker process for information that could affect investor behaviour (Zhang et al., 2013).

Based on the previous research, the psychological biases' influences on investor behaviour and stock prices have been investigated by several scholars (Daniel et al., 2002). The increasing number of studies focusing the price changes that are unrelated to fundamentals in the stock markets indicates that the behaviour biases-caused price drift that could not be explained by the traditional capital asset pricing models are being paid more attention. As Shiller (2003) recommended in his study, behavioural finance could be a sensible explanation to the weaknesses of the efficient market theory. By taking the gossip news into research, this study could provide a new angle for considering the information-caused price drift based on the investor attention theory.

In the previous study of Daniel et al. (2002), they argue that psychological biases could lead to variations in investor behavior and price fluctuations. Also, individual investors' attention to stocks could promote their buying activities (Barber and Odean, 2008). Thus, the intensive individual investor attention could bring a temporarily increasing trend in stock prices while the stock's utility would be detracted, finally leading to disappointing returns (Barber and Odean, 2008).

Referring to the investigation of Huberman and Regev (2001), after estimate the correlation of efficient market hypothesis on asset pricing, they find out that the stock price movement could be caused by non-fundamental information.

As the theoretical model argues, the limitation of investor attention could be a rational reason for the delay responses in price discovery (Hirshleifer et al., 2008; Peng and Xiong, 2006). Additionally, limited attention could make price drifts in particular cases. The study of Da et al. (2011) suggests that investor attention could cause a short-term positive pressure on the stock prices. Meanwhile, the research conducted by Zhang et al. (2013) proved the same conclusion. Their finding also suggests that investor attention could lead to the abnormal return on stocks during a short period (Zhang et al., 2013).

The study may give an indication of the information's influence on stock return along the principle of behaviour finance.

## **2. Event, Methodologies and Hypothesis**

### **2.1 Background Information and Event Selection**

The main subject of this study is whether the gossip about the company's CEO, which is not related to the company's fundamental, would affect the company's stock performance. The main target company is a Chinese company called JD.com. JD.com is an e-commerce company of which main business is running a B2C platform as an online retailer. The company was founded in 1998. After this, the company develop rapidly. On May 22 2014, JD.com became China's first major e-commerce company to list on New York's NASDAQ stock exchange, under the ticker "JD." (Corporate.jd.com, 2017).

The company's founder, Qiangdong Liu, is a middle-aged businessman. The large number of gossips about Liu's personal life are always catch highly public attention. Liu got married in August 2015 with a girl 19 years younger than him, whose name is Zetian Zhang. Zhang is an internet celebrity better known as "milk tea sister" for one of her photos holding the milk tea wildly spread on the social website since 2009 (English.sina.com, 2017). Since Zhang was among the first social media influencers and Liu is a successful well-known businessman, and the gap between their age and the difference in their life experience, their relationship has been gained large amount of attention and suspicion.

Their relationship was first confirmed through social media on 10 April 2014. There is an interesting fact that the date is about one month ahead of the time of JD Company's listing on the NASDAQ stock exchange. Some suspension about whether Liu is using his personal life to gain public attention as a commercial strategy has been started since that. After the company listed, there are still several hot gossips about their relationship gained large amount of public attention. In this study, three main events of the gossip about their relationships are chosen to be analysed. The first event is for the date of Liu proposed to Zhang, on 26 May 2015. The second date is on 1 October 2015, which is the date of their wedding. And the third event is on 24 March 2016. It is the date that their daughter was born. Between all these three events there are no significant changes on the company's leadership or financial position. This study is attempted to find whether the stock price of the company would have significant fluctuation around the event date or not.

Regarding to the financial position of JD Company, from the company's semi-annually financial report it shows the company's business is relatively stable. The large amount of cash flow and the increasing trend of the revenue illustrate the company is running a sustainable business. It is also widely known that the company is one of the biggest electronic commercial companies in China.

However, there is no large event occurred during the period of our estimation. The stable business and development status of JD Company show that it is suitable for the case study.

**Table 1.** Financial position of JD Company

|             | Revenue    | Operating cash flow |
|-------------|------------|---------------------|
| 30-Jun-2015 | 82569.262  | 3921.521            |
| 31-Dec-2015 | 181286.955 | 1696.322            |
| 30-Jun-2016 | 118866.598 | 5159.948            |

The monetary unit is million presented by Chinese RMB currency.

## 2.2 Methodologies, Data Source and Hypothesis

To estimate the existence and significance of influence, the event study methodology is applied in this study. As to conduct an event study, the first step to define the event that might have influence on the stock return. In this study, there are three events being specified in the estimation. Which are explained in the last section. The next step is to select criteria for the firm. Considering the market of the company listing on, the NASDAQ market index is being applied to compare with the company's stock return. Moreover, the normal and abnormal return will be measured to clarify the event's impact. The abnormal return is the difference between actual return in the event window and the normal return defined as the expected return based on the estimation in the pre-event window. The empirical result will be presented after the test procedures and the significance of the event's impact will be tested as well.

The original data being used are the JD Company's stock price and the NASDAQ stock market index. The data of prices and index are all obtained from Bloomberg. Based on the date of events, the price list of JD Company and NASDAQ index from 7 August 2014 to 22 April 2016 are obtained for this study (totally 431 observations for each subject).

Aiming to access the stock and market return through the price list, the series of company's stock return and market return are being generated. The equation being used to seize stock and market percentage return on the date by using the daily price data is as follow:

$$R(0) = (P(0) - P(-1))/P(0)$$

To explain the variables in the equation, set the day of estimation by day 0,  $R(0)$  represents the stock return of day 0 while  $P(0)$  and  $P(-1)$  is the stock price of the day 0 and the stock price of the day before the estimation date separately.

To analyse the relationship between the market return and the company stock return, the market model is putted in use to estimate the relationship during the pre-event window between the corporate stock return and market return in this study. The market model is a statistical model that connect the return between the single security and the market. It could reduce the variance of abnormal return in case to improve the reliability of the test (Campbell, Lo and MacKinlay, 2012).

To introduce the estimation of the market model, the market model equation is displayed below:

$$R_{it} = \alpha + \beta * R_{mt} + e_{it}$$

In this model,  $R_{it}$  presents the return on the stock  $i$  during the  $t$  time period. Where  $R_{mt}$  shows the return of market index during the period- $t$  respectively. And  $e_{it}$  is the zero mean disturbance term.  $\alpha$  and  $\beta$  are both parameters of the market model that clarify the relationship between the specific stock and the based market index. This equation is being applied to the period before the event window, which also called the estimation window. All the coefficients are measured under the Classic Linear Regression Model (CLRM) by using the ordinary least squares (OLS) regression. By using this technique, the difference between the estimated coefficients in the model could be minimised. Therefore, the best fitting estimates could be generated. These coefficients will be used generate the expected normal return equation then being used to calculate the abnormal return.

Once the parameters of market model are acquired, they could be used to generate the abnormal return series. The statistical properties of abnormal returns are generated by the OLS estimators. Define  $CAR_i(t_1, t_2)$  as the cumulative abnormal return for security  $i$  from  $t_1$  to  $t_2$  (where  $t_1 < t_2$ ).

The abnormal return (AR) and cumulated abnormal return (CAR) will be measured in the event window by using the equation below:

$$Ai = Ri - \alpha - \beta * Rm$$

$$CARi(t1, t2) = \sum_{t=t1}^{t2} Ait$$

Where  $\alpha$  and  $\beta$  are obtained from the last step, and the other parameters are the data of the event window. As to the calculation of CAR, the time period is from  $t1$  to  $t2$  in the equation.

Referring to the test of significance of CAR, t-test will be conducted to test the significance of CAR under the null hypothesis of CAR equal to zero. The outputs will state the significance of CAR within each event and interval in the estimation. The procedure for analysing a single company with time series data are showed below:

Compute mean CAR for the event window as:

$$\overline{CAR}_{t1,t2} = \frac{1}{t2 - t1} \sum_{T=t1}^{t2} CAR_T$$

After obtaining the simple mean of CAR for the event window, then calculate the standard error of CAR as:

$$S(CAR_{t1,t2}) = \sqrt{\left( \sum_{T=t1}^{t2} (CAR_T - \overline{CAR})^2 \right) / (t2 - t1 - 1)}$$

Next, conduct the t-ratio test as:

$$t = \frac{\overline{CAR}_{t1,t2}}{S(CAR_{t1,t2})}$$

For purpose of find more information and evidence about the impact of the event, three intervals of the event window are being set. The event windows are set from 5, 10 and 20 days respectively before and after the event date ( $t=0$ ). Under the rule of no overlapping, the estimation windows are set as the 200 days before the event date to the date of a day before the event window started. The timeline of these three events is in the table below:

**Table 2.** The settings of the timeline and specific date of the events

| Event Date             | Estimation window                      | Event window                          |
|------------------------|----------------------------------------|---------------------------------------|
| Event 1<br>26-May-2015 | [-200, -5]<br>07-Aug-2014~15-May-2015  | [-5, +5]<br>18-May-2015~02-Jun-2015   |
|                        | [-200, -10)<br>07-Aug-2014~08-May-2015 | [-10, +10]<br>11-May-2015~09-Jun-2015 |
|                        | [-200, -20)<br>07-Aug-2014~24-May-2015 | [-20, +20]<br>27-Apr-2015~23-Jun-2015 |
|                        |                                        |                                       |
| Event 2<br>01-Oct-2015 | [-200, -5)<br>15-Dec-2014~23-Sep-2015  | [-5, +5]<br>24-Sep-2015~08-Oct-2015   |
|                        | [-200, -10)<br>15-Dec-2014~16-Sep-2015 | [-10, +10]<br>17-Sep-2015~15-Oct-2015 |
|                        | [-200, -20)<br>15-Dec-2014~01-Sep-2015 | [-20, +20]<br>02-Sep-2015~29-Oct-2015 |
|                        |                                        |                                       |
| Event 3<br>24-Mar-2016 | [-200, -5)<br>09-Jun-2015~16-Mar-2016  | [-5, +5]<br>17-Mar-2016~01-Apr-2016   |
|                        | [-200, -10)<br>09-Jun-2015~09-Mar-2016 | [-10, +10]<br>10-Mar-2016~08-Apr-2016 |
|                        | [-200, -20)<br>09-Jun-2015~24-Feb-2016 | [-20, +20]<br>25-Feb-2016~22-Apr-2016 |
|                        |                                        |                                       |

The time period of [-200, -5) means the closing and opening period of the study due to the no over-lapping rule of the event study. And for the event window, the periods are all closing period during the estimation.

In case to explore the potential reason of the empirical results based on the previous knowledge and studies, the level of gained public attention by the different events are also being concerned in the study. Along with the most adopted measurement, the investors' attention is measured by the searching volume index (SVI) provided by Google Trend. The SVI of the keyword of the name of Liu and Zhang from the date of 22 April 2015 to 22 April 2016 are obtained for this study. Besides, the correlation analysis test between the SVI of Liu and Zhang will also be carried out. The purpose of this test is to confirm the change of SVI being observed in this study is due to the gossip between their relationships instead of the other information.

### 3. Experimental Results

After running the statistic tests for three events of the gossip news about JD Company's founder's personal life, the abnormal returns are obtained by using the market model. The cumulative abnormal returns (CARs) and the significance of CARs from each event and each interval are calculated as well.

**Table 3.** The estimation of the coefficients and the significance tests of market model

|         |             | $\alpha$  | Prob. $\alpha$ | $\beta$  | Prob. $\beta$ |
|---------|-------------|-----------|----------------|----------|---------------|
| Event 1 | [-200, -5)  | 0.000420  | 0.80           | 1.119830 | 0.00*         |
|         | [-200, -10) | 0.000538  | 0.75           | 1.108467 | 0.00*         |
|         | [-200, -20) | 0.000618  | 0.73           | 1.099705 | 0.00*         |
| Event 2 | [-200, -5)  | 0.000266  | 0.88           | 1.032635 | 0.00*         |
|         | [-200, -10) | 0.000650  | 0.71           | 1.008577 | 0.00*         |
|         | [-200, -20) | 0.000494  | 0.78           | 0.981396 | 0.00*         |
| Event 3 | [-200, -5)  | -0.000579 | 0.76           | 1.421476 | 0.00*         |
|         | [-200, -10) | -0.000759 | 0.69           | 1.399563 | 0.00*         |
|         | [-200, -20) | -0.000717 | 0.72           | 1.427699 | 0.00*         |

Test based on OLS regression method.

\* Indicates significant at 5% (or better).

**Table 4.** The CARs and t-statistic value for the events

| Event   | Windows   | CARs   | t-value   |
|---------|-----------|--------|-----------|
| Event 1 | [-5,+5]   | 0.031  | 3.97***   |
|         | [-10,+10] | 0.067  | 0.13      |
|         | [-20,+20] | -0.036 | -0.90     |
| Event 2 | [-5,+5]   | 0.107  | 7.71***   |
|         | [-10,+10] | -0.022 | 1.40      |
|         | [-20,+20] | 0.021  | 1.97      |
| Event 3 | [-5,+5]   | -0.076 | -10.63*** |
|         | [-10,+10] | -0.013 | -1.83     |
|         | [-20,+20] | 0.024  | -1.14     |

This table presents the cumulative abnormal returns in different length of event windows for different events. The date of event of gossip being investigated are defined as date  $t=0$ .

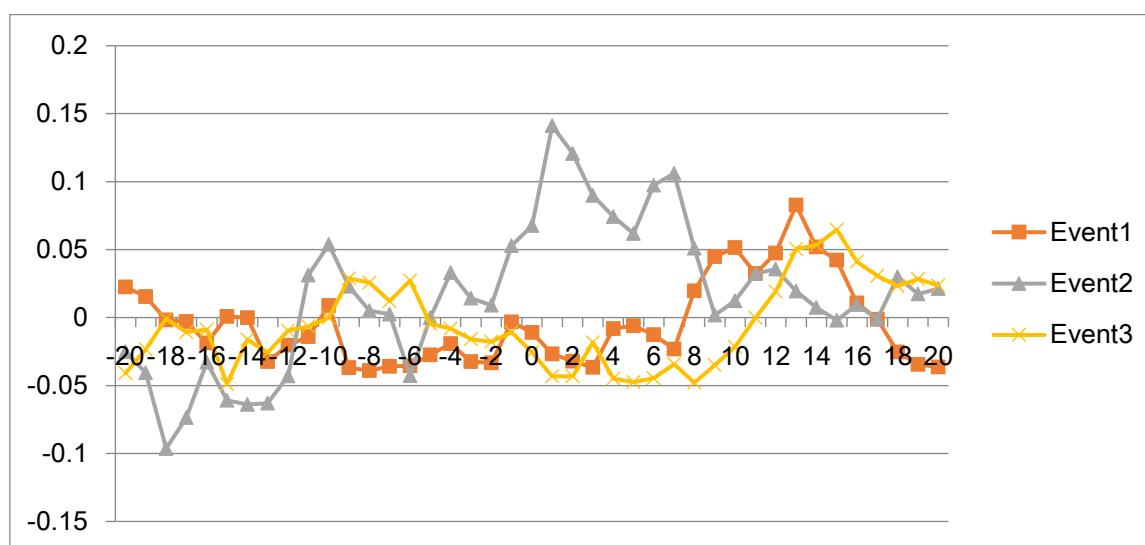
The t-statistics tests the null hypothesis that the cumulative abnormal returns have the zero means.

\*\*\*Statistically significant at 1%

The results showed in the table 3 include the estimated market model parameter during different estimation windows for all the events. The parameter of  $\alpha$  presents the constant value in the equation while  $\beta$  shows the coefficient of market return, which could indicate the relationship between the company's stock return and market return. The value of  $\alpha$  and  $\beta$  together with the p value of each parameter illustrate that the numerical value of  $\alpha$  is small and it is insignificant at 95% level. The value of  $\beta$  is all close to 1 and the p value suggest it is significant on the 95% level, which indicate that the stock return is highly correlated with the market return throughout the whole period. The highly consistency of stock return and market return could be inferred from this evidence. The value

of each coefficient has not changed much during the whole estimated time horizon, which indicate that the linear relationship between stock return and market return is approximately stable with time elapsing.

Aiming to seek the development tendency of the cumulative abnormal returns, the plot of cumulative abnormal return for three events during the event window of -20, +20 is presented below. Figure 1 reveals the change of cumulative abnormal returns for three events respectively. From the figure, it could be seen that there is not enough fluctuation in CARs during the period before the event day for all these events. However, after the event day the CARs for all the events are likely to experience some fluctuations in varying degrees. Further, within the period of date between +11 to +17, all the events are having the positive cumulative abnormal return. Right after that period, the cumulative abnormal returns are showing the trends of returning to a negative value or drop sharply to a negative value.



**Figure 1.** The plot of cumulative abnormal return for three events

From a glance of the numerical output in table 4, it could be observed that the direction about the abnormal return seems quite different. Although these three events are all about the similar news, the cumulative abnormal returns (CARs) are not in the same direction. During the interval of days -5 to +5, the cumulative abnormal returns for three events are 0.031%, 0.107% and -0.076% separately. Moreover, the plot also indicate that the speed of the events' effects starts working and fading away for each event are not the same.

**Table 5.** The correlation analysis for SVI with the keywords of Liu and Zhang

|       | Liu    | Zhang  |
|-------|--------|--------|
| Liu   | 1      | 1.357* |
| Zhang | 1.357* | 1      |

\*indicates the coefficient between the SVI is significant at 5% level

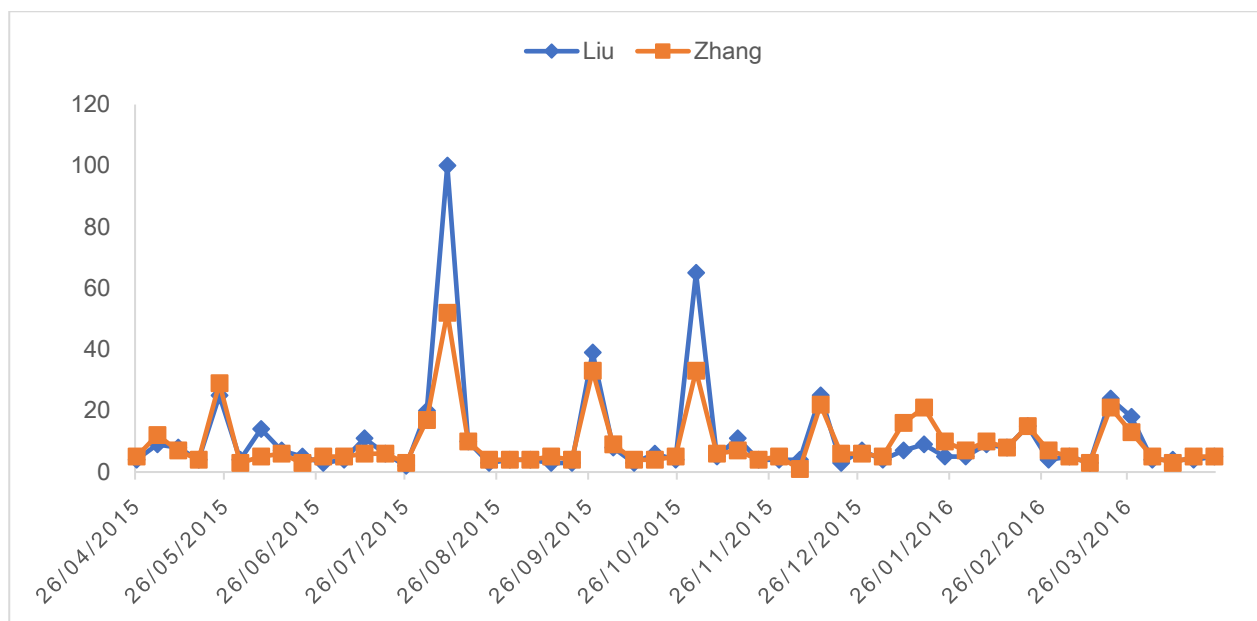
**Table 6.** The weekly SVIs around each event date

| SVI     | Liu | Zhang |
|---------|-----|-------|
| Event 1 | 25  | 29    |
| Event 2 | 39  | 33    |
| Event 3 | 24  | 21    |

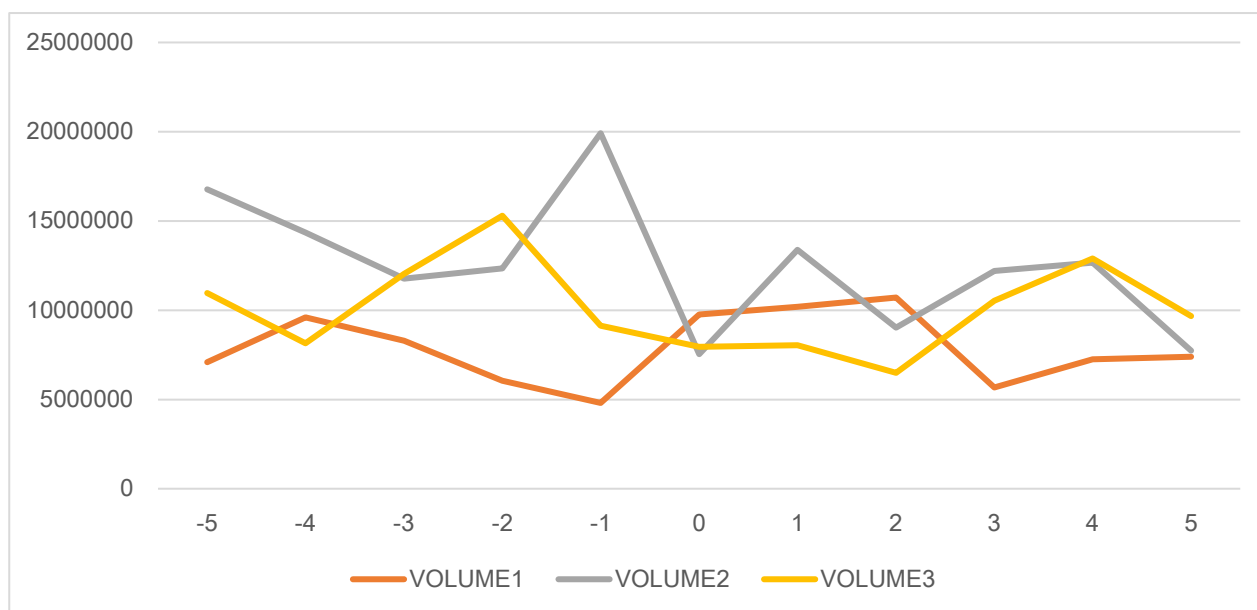
A value of 100 is the peak popularity for the term. A value of 50 means that the term is half as popular. Likewise, a score of 0 means the term was less than 1% as popular as the peak.

To investigate whether the different level of investor attention received would affect the response of stock return for the event, the SVIs for the keywords of Liu and Zhang's names during the whole

period including three events are obtained from Google trend. The correlation analysis output and the plot of Google searching index for the name of Liu and Zhang are showed below. The SVIs around each event date are also highlight in the table 5.



**Figure 2.** The plot of weekly SVI for the keywords of Liu and Zhang



**Figure 3.** The plot of the trading volume during the -5 to +5 period windows for three events

The result from correlation analysis for the keyword of Liu and Zhang's name are showed in the table 5, the coefficient of 1.357 that is closely to 1 proves that the SVIs of their names could represent the public interest of their relationship to some extent. The comparison of their searching volume trend in figure 2 presents the searching interest of their names are almost in the exact same trend, which could also provide the evidence of the correlation relationship between their names in public attention. The data of the stock's daily trading volume are also obtained and the plot of the change of trading volume for each event during the -5 to +5 period event window is presented by figure 3. The trend of trading volume indicates that the trading volume of event 1 and event 2 are reflecting the positive response for the event. Under the comparison, the trading volume of event 3 did not present any quick and clear response to the event.

The effect for the after-publication periods of each event are also being estimated. Aiming for the further detailed information for the CARs, the mean CAR in the period of (0, +5) event window after the event date is obtained from each of the event. In table 7, it can be seen that the positive significant mean CAR for event 1 and event 2 and the negative significant mean CAR of event 3 during the after-publication period proves the first two gossip news do have a positive impact on the stock return while the last event shows an opposite result. Among the three events, event 2 shows a large percentage CAR of 0.142% during the after-publication period of event date. Comparably, the CAR of event 1 seems relatively small of the average CAR of 0.017%. Nevertheless, the negative CAR of -0.068% for event 3 during the after-publication period is rather low. From the test results of the after-publication period, the existence of effects from gossips news on stock return is virtually certain.

**Table 7.** The mean CAR of (0, +5] event window and significance test for three events

| (0, +5] | CAR%   | t-stat  |
|---------|--------|---------|
| Event 1 | 0.017  | 3.48*   |
| Event 2 | 0.142  | 9.70*   |
| Event 3 | -0.068 | -12.61* |

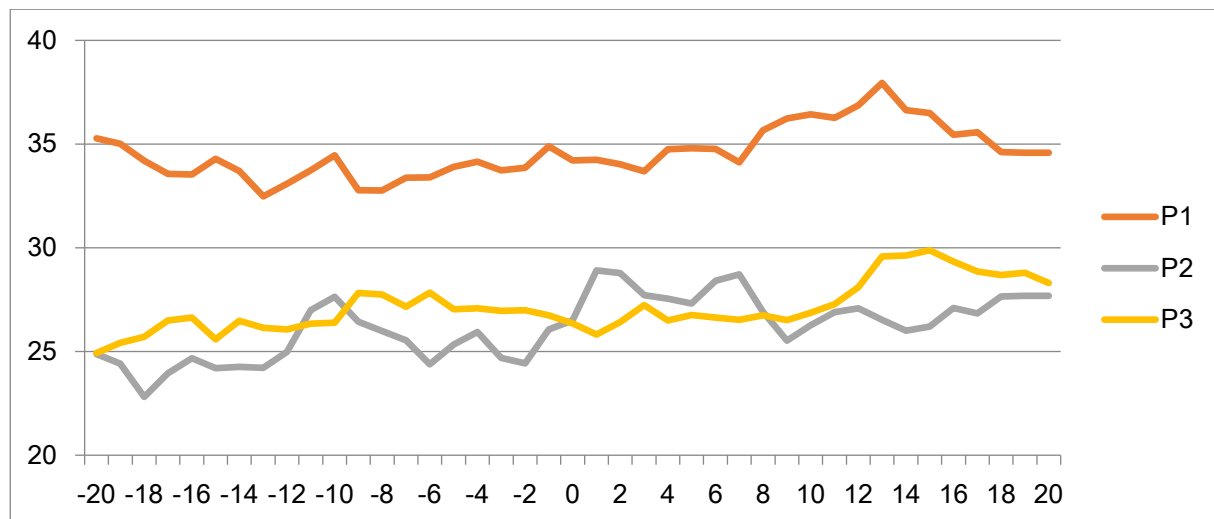
This table presents the cumulative abnormal returns in the after publication period event windows for different events.

The date of event of gossip being investigated are defined as date  $t=0$ .

The t-statistics tests the null hypothesis that the cumulative abnormal returns have the zero means.

\*Statistically significant at 5% or better.

The figure below presents the trend of stock price of JD Company during each 20 days before and after event date period. The prices of the company's stock during the 41 days intervals are shown together. By analysing the stock price and the other results above together, the prices of the stock are showing the similar trend by comparing with the changes of stock return. The prices are fluctuated around the event date then turn back to the normal level. However, during the short periods of the events there are probabilities to get abnormal earnings.



**Figure 4.** The plot of JD Company stock price of each event period

E.g. P1 represent the stock prices from event 1

## 4. Conclusion

The evidence from empirical study has confirmed there do exist abnormal return around the date of gossip news being published. However, from the three events being chosen, the two of them compute the positive significant abnormal return while the other one generates negative significant

abnormal return. In consideration of the searching volume and the trading volume, the possible explanations for the empirical estimation results are discussed as follows.

Firstly, the gossip news about the company's founder do have impact on the company stock return. Due to the unchanged company's fundamentals, the effect of investor attention-generated abnormal return could not be sustained for a long period. From the result, the abnormal returns are neutralized after five trading days. The cumulative abnormal returns are no longer significant for all the events during a longer period. The suggestion from this situation is the extra attention could not generate value for the company's stock at all events. Furthermore, the price drift caused by extra investor attention agrees with the investor attention theories in behaviour finance. This part of results is consistent with the previous studies of the investor attention effect of price anomalies and the efficient market hypothesis (Bank et al., 2011; Li et al., 2011).

Secondly, the different degree of reaction from different event could explained by the level of attention received by the gossip news. Based on the consideration of the searching volume presented by the SVI obtained from Google Trend, along with the trading volume of the stock, the causal relationship between these variables could be explained as follows. As the gossip news released, it leads to the rise of the public attention. Then give pressure on the trading volume and the stock price. After comparing the results from three events, there is a positive relationship between public attention and the value of cumulative abnormal return. As the higher attention gained from public, the abnormal return would be larger, the response of stock price would be stronger as well. The trading activeness could be proved by higher attention from the investors, and the stock price could be lifted by the large degree of attention during a short period. However, the effects of attention on trading direction and the positive or negative changes on stock price could not be confirmed based on the results in this research.

Moreover, related to the previous studies, the negative abnormal return from the third event might be related to the general market background. As the previous study suggested, the cumulative abnormal return would be different due to the market background. The cumulative abnormal return could be positive during the bullish market, and oppositely, the cumulative abnormal return could be negative due to the asymmetric investor behaviour when experiencing the bearish market. As the American stock market were turning bearish from bullish since the year of 2016, which is exactly the time boundary between the first two events and the third event. As the consequence, the negative abnormal return generated from event 3 might be explained. Anyway, considering the difference in searching volume of event 3, the exact reason for the negative abnormal return was failed to be confirmed with this study.

This study is with the new conception since the quantity of existing studies about specific information's impact on stock return is limited. Considering the particularity of gossip news, as its character of wild spread range and the quick spreading speed comparing to the other information, the effects from the gossip news would be worthy to investigate. The query of whether the leadership of the company could use their personal information to create the sensationalization as the commercial strategy and the principle of the operation could be explained by the results from this study. Through the result from this study, it shows that it is possible that the leadership of the company could use the news related to their personal life to raise public attention for the company's benefit. This study shows that the stock price could be affected by the gossip about the company's leadership during a short period from the evidence of the NASDAQ listed Chinese company. Nevertheless, whether the leading character of the company could use their personal gossip to affect the stock price as they designed successfully is questionable.

The results are consistent with the previous study of short-term effects of investor attention on asset pricing. Given the limited theoretical evidence and the few numbers of empirical findings about the effect of specific attention attracting information on stock market, it suggests that further research will need to be conducted. The reason for the generation of the positive or negative abnormal return in the event window could be explored for a more particular explanation. The effects from the bullish

or bearish market background could be waited for further affirmation. Whether the degree of attention would have the positive and negative effects on the abnormal return remains to be confirmed as well.

In the view of the case being studied in this research topic, the results showed that JD Company has suffered from some negative returns due to the gossip event related to the CEO. However, whether the situation would be different if the key man of the gossip is not the central figure of the company. The degree of dependency between the influence on the company's stock and the main role of the gossip information could be further investigated. If the negative return is not related to the bullish or bearish market background, the company may consider asking the leading figures to keep their personal life away to avoid the unnecessary lost on the company's stock.

However, the universality of the irrational behaviour observed in this study could not be affirmed due to the limited cases being focused on in this study. Whether it is a common situation toward all the companies and stock market is still an open question. Further research about the specific information causing investor behaviour biases could be proceeded.

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