Research on the Stock Market Response to Earnings Management Behavior

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Abstract   Event study method was used in the article. It is thought that the changes of stock prices before and after the date on which the accounting report is published, comparing with the annual average stock price may reflect the information of market response to earnings management. Bivariate regression model was found and showed that the average stock price has not significant correlation with net profit and cash flow of operating activities before and after the date on which the accounting report is disclosed, it is influenced by various factors. Securities regulatory department should supervise and control effectively the disclosure of the information or data in accounting reports, so as to promote a healthy development of securities business.
Key words   Accounting reports; Earnings management behavior; Market response; Bivariate regression model

1 Introduction

1.1 Research situation at home and overseas

It is earlier about the research of earnings management behavior at overseas，especially dividends behavior research has increasingly become active in 1950's. Early dividends theories are mainly about standard study. Popular theory is figuratively called "bird in hands"，it is to say ,the investors prefer the current revenue，namely cash bonus[1]. But at home，Weigang researched on the market response to dividend distribution scheme of last year in1998. statistical inspection results show that dividend distribution policy affects the listed company's stock price，bonus shares is quite popular than cash obviously.

1.2 Research method

Event Study Methodology inspects the effect of event's market behavior by inspecting the difference between the market behavior surrounding the event and normal market behavior. The default logic relationship of Event study methodology is that if the company's information disclosure may truly change the investor's expectation, then the "information content" of disclosed information can be compared by the change of abnormal yield rate.

The accounting report contains earnings management information. The stock prices are the concentrated responses to all factors such as various expectations, opportunistic factors, judgments, decisions and psychological factors. They are the final game results between two parties in a transaction in the capital market. Therefore, to study the response of stock price to accounting report may explain the market response to earnings management. Event Study Methodology can be reduced to the follow steps[2]:

Firstly, defining the event. An event is the accounting report disclosed by a listed company. Event window is 20 days before and anther 20 days after the accounting report is published, total 40 days (the stocks are suspended on the publishing date of accounting report, no transaction data.)

Secondly, sampling standard. Select A stock companies listed in Shanghai Stock Exchange as the objection of research. These companies have indicator data such as dates of publication, number of days, closing prices, 20 days before and 20 days after the publishing date of accounting report, etc.; and there are 703 companies in 2008. All data here are provided from CSMAR database by Shenzhen GTA IT Co., Ltd.

Thirdly, calculating average stock price of a year and the change rate of daily stock price in event window/average stock price.

1.3 Computing formulas by steps

First,
$$\overline{p}_i = \sum_{t=1}^{t=n} p_{it} / n \tag{1}$$

In which, $\overline{p}_i$ as the average closing price of the i (1st, 2nd, 3rd, 4th …) stock in a year; p_{it} as the closing price of the i (1st, 2nd, 3rd, 4th …) stock on the t(1st, 2nd, 3rd, 4th …) day; n as the number of transaction days of this stock for a whole year.

Second, $$R_{it} = (p_{it} - \overline{p}_i) / \overline{p}_i \tag{2}$$

In which, R_{it} as the rate of calm base yield of the i (1st, 2nd, 3rd, 4th …) stock on the t (1st, 2nd, 3rd, 4th …) day.

Third, $$R_{C/NI} = CFO / NI \tag{3}$$

In which, $R_{C/NI}$ as the ratio that the net cash flow of operating activities occupies in the net income; CFO as the net cash flow of operating activities; NI as the net income.

Fourth, $$\overline{R}_{it} = \sum_{i=1}^{i=I} R_{it} \Big/ I \tag{4}$$

In which, $\overline{R}_{it}$ as the mean value of R_{it} in each group on the t (1st, 2nd, 3rd, 4th …) day after grouped subject to $R_{C/NI}$; I as the total number of stocks in each group after grouped subject to $R_{C/NI}$; i as the an individual stock; and t as the transaction date in the event window days.

Fifth, data computing. $\overline{p}_i$ is computed by using of the closing prices on the transaction days for a whole year; compute R_{it} in the event window and group R_{it} in unequal intervals according to the $R_{C/NI}$ value; compute $\overline{R}_{it}$ of each group; inspect the response of the stock price to various earnings management behaviors through the degree of changes of $\overline{R}_{it}$.

Sixth, describing with graph. Draw the change curve of $\overline{R}_{it}$ in event window; inspect the influence of the event to the stock prices.

Seventh, mathematical statistics should be used to prove the correlation between $\overline{p}_{-20}$ and NI and CFO factors in its corresponding groups as well as that between $\overline{p}_{20}$ and the NI and CFO factors in its corresponding groups in different intervals of $R_{C/NI}$, and then makes a regression analysis.

Finally, illumination, analysis and conclusion[3].

2 Analysis of Stock Market Response to Earnings Management Behavior

Analysis of stock market response includes descriptive analysis and regression analysis[4].

2.1 Descriptive analysis

Table 1 shows the ratio between the closing prices of 20 days before and 20 days after the publishing date of accounting report and average closing price in-the-whole-year of 703 sample companies listed in Shanghai Stock Exchange in 2008. Then average the ratio value again according to $R_{C/NI}$, $\overline{R}_{it}$ is obtained.

All $\overline{R}_{it}$s are grouped into 9 unequal interval groups according to the value of $R_{C/NI}$. It is generally considered that when CFO approaches to NI, the earnings quality of a company or enterprise is better, and most of the operating cash flow forms the income, that is, CFO=NI. Therefore, it can be described as (-∞, -20), [-20, -4) and (20, +∞) groups are all major earnings management groups and the human manipulation trace is very obvious. While Group [0.5, 2) and Group [2, 4) are considered as more assorted groups due to the CFO and NI are comparatively consistent.

Table 1　　$\overline{R}_{it}$ **(Data of Partial Groups) With 20 Days Before and 20 Days After The Publishing Data of Accounting Report In 2008**

CFO/NI	R on the 20th day before the publishing date	19 days before the publishing date	18 days before the publishing date	17 days before the publishing date	16 days before the publishing date	15 days before the publishing date
(-∞,-20)	0.382441	0.372829	0.368436	0.366439	0.363038	0.362915
[-20,-4)	0.242647	0.242195	0.238663	0.243097	0.246026	0.25212
[-4,-2)	0.241509	0.241094	0.24627	0.247934	0.246191	0.244329

The closing price on the publishing date of accounting report	1 day after the publishing date	2 days after the publishing date	3 days after the publishing date	4 days after the publishing date	5 days after the publishing date	6 days after the publishing date
0	0.343735	0.33072	0.335381	0.340805	0.328759	0.325353
0	0.223828	0.217235	0.216313	0.215639	0.215713	0.20625
0	0.19489	0.192496	0.188913	0.177296	0.173005	0.17434

| 14 days after the publishing date	15 days after the publishing date	16 days after the publishing date	17 days after the publishing date	18 days after the publishing date	19 days after the publishing date	20 days after the publishing date
0.346424	0.365782	0.354924	0.326635	0.320453	0.322412	0.295081
0.188815	0.188473	0.186741	0.18376	0.171074	0.163734	0.152785
0.163971	0.159104	0.144165	0.124725	0.126111	0.118898	0.117267
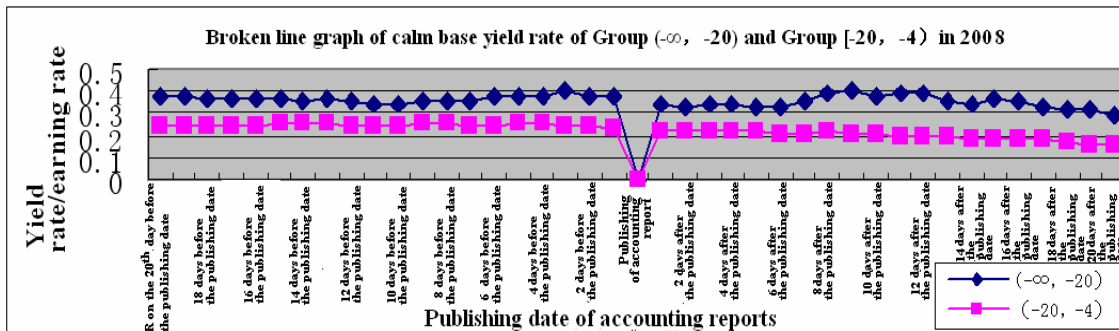
Figure 1　　Broken Line Graph of Calm Base Yield Rate of Group (-∞, -20) and Group [-20, -4）in 2008
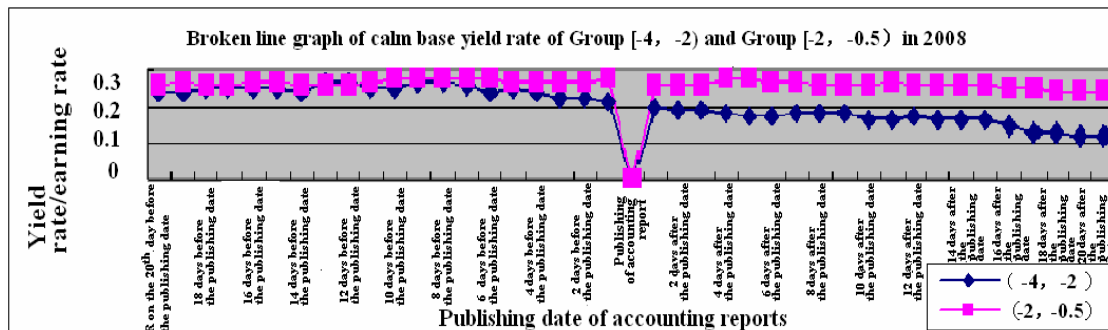

Figure 2　　Broken Line Graph of Calm Base Yield Rate of Group [-4, -2) and Group [-2, -0.5）in 2008
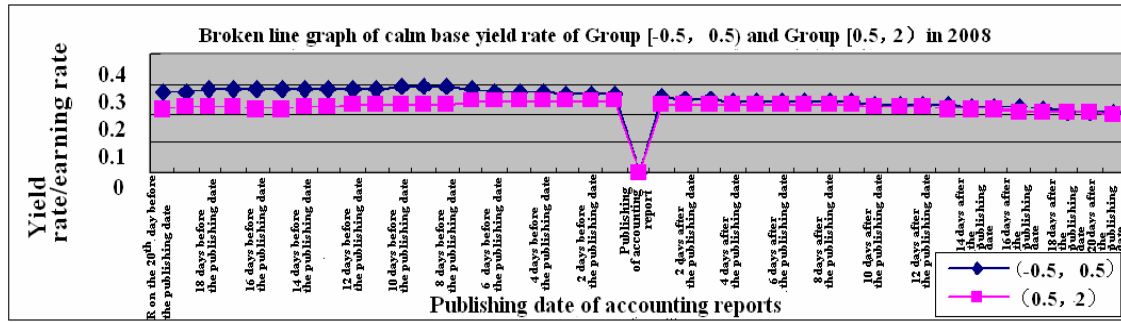
Figure 3　Broken Line Graph of Calm Base Yield Rate of Group [-0.5, 0.5) and Group [0.5, 2）in 2008
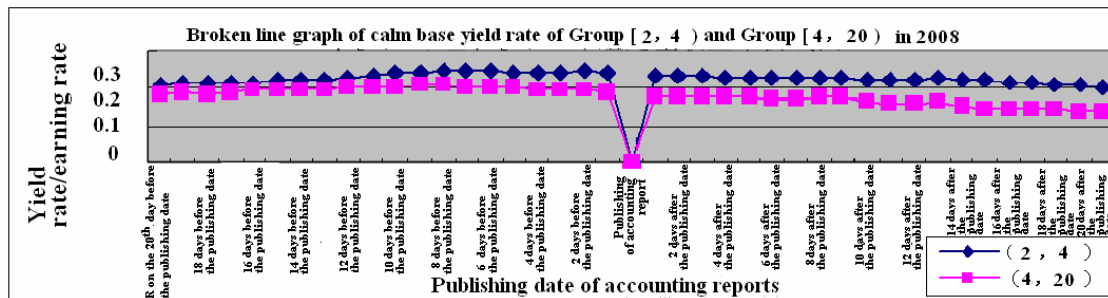

Figure 4　Broken Line Graph of Calm Base Yield Rate of Group [2, 4) and Group [4, 20）in 2008
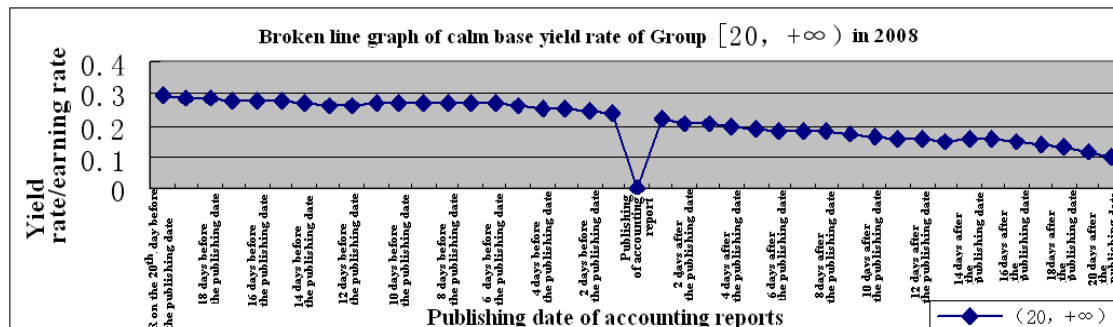

Figure 5　Broken Line Graph of Calm Base Yield Rate of Group [20, +∞）in 2008

Total 9 curves in 5 graphs in 2008 could tell the following features:

On the publishing date of accounting report, due to the suspension, there is no data on this day and $\overline{R}_{it}$ of all groups approaches to point 0. Group (-∞，-20), [-4，-2), [0.5，2) and [20，+∞) are described as: Curve for Group (-∞，-20) is close to 0.4 in 20 days before the publishing date of accounting report. It starts to rise upward in 10 days before the publishing date and maximum up to 0.4. After the publishing date, it falls down and fluctuates at the range of 0.3-0.4. Observed from whole, the yield rate of this group is the highest in all groups. That means the capital market adopting venture for the major earnings management behavior did not negative such stocks, but even supported such speculation behaviors with the highest $\overline{R}_{it}$.

Group [-4，-2) begins to fall down from its highest point 0.27 in 8 days before the publishing day of accounting report, this means the capital market has predicted or has been aware of the contents of accounting report and has made response in advance. Then it keeps falling down all the way till close to the lowest point 0.1 on the 20th day after the publishing date of accounting report. For such stocks with such degree of earnings management, the market has not expectation of speculation; therefore, their stock prices kept falling down all the way to the lowest point without waiting for the publishing of

accounting reports.

The CFO and NI is very close in Group [0.5，2), theoretically, it is a very good state between the income quality and report quality. The curve rises up to 0.25 before the publishing date little by little from 0.2 before the publishing date, and then it falls down bit by bit till to 0.2 again on the 20th days after the publishing date. The curve before and after the publishing date of accounting reports is similar to a straight line, without much change. That means the market's evaluations to such income quality are much consentaneous.

Group [20，+∞）kept falling down all the way from 0.3 on the 20th day before the publishing date, and slumped to 0.1 on the 20th day after the publishing date. However, from the 12th day to the 4th day before the publishing date, the curve showed a partial rebound. That means there were speculative expectations in the market. After accounting information and data was published, the market presented a rapid response and the yield rate dropped severely. However, the speculative expectations offered such stocks a survival opportunity from dropping to nothing and kept them at a relatively lower level.

2.2 Regression analysis

Following models are used in the regression analysis[4]:

$$\bar{p}_{-20} = \alpha + \beta_1 \times NI + \beta_2 \times CFO$$

$$\bar{p}_{20} = \alpha + \beta_1 \times NI + \beta_2 \times CFO$$

$\bar{p}_{-20}$ and $\bar{p}_{20}$ as the average stock price in 20 days before and 20 days after the publishing date of accounting reports respectively; NI as the net income, CFO as cash flow of operating activities; confidence coefficient as 95%.

Inspect the linear relationship between average stock prices and net income and cash flow of operation in 20 days before and 20 days after the publishing date of accounting reports with models.

Table 2   Inspection Result of Multiple Regression Between $\bar{p}_{-20}$ and NI and CFO in 2008

Group	α			b_1			b_2			Multiple R
CFO/NI	α value	t-Stat	P-value	b_1 value	t-Stat	P-value	$b_2$value	t-Stat	P-value	
(-∞,-20)	0.339161	2.790946	0.049264	3.78827E-08	1.325177	0.255739	6.48E-10	1.073669	0.343426	0.552659055
[-20,-4)	0.240667	16.34107	4.84E-19	-2.10027E-10	-0.15733	0.875795	-4.2E-11	-0.23489	0.81552	0.338082193
[-4,-2)	0.277867	7.091763	5.41E-06	-4.02185E-09	-1.36142	0.19489	-9.8E-10	-1.15343	0.268046	0.388055883
[-2,-0.5)	0.272828	10.9182	5.65E-13	8.87473E-10	1.218821	0.230839	9.03E-10	1.375382	0.177512	0.224152764
[-0.5,0.5)	0.277609	16.72063	2.28E-31	-2.17963E-11	-0.58111	0.562413	-2.4E-11	-0.13265	0.894723	0.056996262
[0.5,2)	0.237785	19.08936	5.14E-48	-1.81463E-10	-1.96436	0.050789	1.01E-10	1.840189	0.067132	0.142495259
[2,4)	0.234166	14.08176	1.73E-27	7.86564E-12	0.038915	0.969021	-5.5E-12	-0.0589	0.953128	0.06759536
[4,20)	0.201819	15.50781	3E-30	-4.19155E-10	-1.32097	0.189067	3.99E-11	1.354173	0.178269	0.124661666
[20,+∞）	0.26216	7.19029	2.54E-07	-1.45388E-08	-2.51641	0.019283	3.89E-10	2.330189	0.02893	0.466099744

The inspection results show that the average stock prices of 20 days before and after the publishing date of accounting reports in Shanghai Stock Exchange in 2008 are basically irrelevant to NI and CFO. What approximates to the linear relation is just the average stock price and NI and CFO of major earnings management group[20，+∞）before the publishing date of accounting reports, they presented the relevance to some extent. That means the net income, cash flow of operating activities in 2008 or both of the two factors affected the stock price infinitesimally.

Table 3   Inspection Result of Multiple Regression Between $\overline{p}_{20}$ and NI and CFO in 2008

Group CFO/NI	α			b_1			b_2			Multiple R
	α value	t-Stat	P-value	b_1 value	t-Stat	P-value	b_2 value	t-Stat	P-value	
(-∞,-20)	0.479215	1.792604	0.147503	3.78E-08	0.601046	0.580209	1.18E-09	0.888189	0.424623	0.418927
[-20,-4)	0.1899	11.1684	1.02E-13	1.12E-09	0.727624	0.47119	1.37E-10	0.655729	0.515849	0.330112
[-4,-2)	0.159018	6.352972	1.79E-05	6.33E-10	0.33566	0.742104	1.67E-10	0.306749	0.763549	0.09275
[-2,-0.5)	0.26329	10.72243	9.33E-13	1.5E-09	2.100845	0.042721	1.1E-09	1.706431	0.096542	0.340904
[-0.5,0.5)	0.231426	13.00514	1.29E-23	9.06E-11	2.252485	0.026372	2.44E-10	1.259711	0.210566	0.2203
[0.5,2)	0.218006	17.34229	1.35E-42	-1.7E-11	-0.18334	0.85471	1.34E-11	0.242622	0.808532	0.032334
[2,4)	0.217326	11.92752	2.57E-22	-2.7E-10	-1.23277	0.219995	1.24E-10	1.213196	0.227361	0.12721
[4,20)	0.163223	13.88216	1.44E-26	-1.1E-10	-0.39566	0.693071	1.04E-11	0.389873	0.697333	0.036443
[20,+∞）	0.164285	4.244201	0.000306	-1.3E-08	-2.06457	0.050418	3.27E-10	1.843355	0.078202	0.401959

3 Conclusion

The obvious difference between the yield/income rate before the publishing date and that after the publishing date means the accounting reports have passed new information to the market, and the market can make response to the accounting reports. That is, $\overline{R}_{it}$ in different $R_{C/NI}$ groups varies significantly. To the major earnings management behavior, the stock market gave a higher expectation first, which is presented by the obvious higher yield rate than average year-round yield rate. That means the speculative factors worked a lot; when accounting reports were published, the stock prices drops down and the lower income quality can not support higher yield rate/income rate, i.e. it can not support higher stock prices. Stock market can identify the earnings management behavior. In the groups that NI and CFO are assorted, the change of yield rate performed steadily. That means the stock market can identify the income quality and make response to it.

The computation of the bivariate regression model shows that the joint influence or effect of the stock price and NI and CFO has an inevitable correlation. They presented correlation in individual groups only; this can not stand for the response to the latter two from the stock prices of whole Shanghai Stock Exchange. This means the stock prices are affected or influenced by various factors. The information and data in the accounting reports affected jointly the stock prices and the speculative factors sometimes played a bigger role. Therefore, the securities regulatory/stock supervision department should strengthen the supervision and control to the disclosure of accounting reports to enable the accounting reports to pass true information to the market so as to promote a fair competition and a healthy development of the stock market.

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