

XUE Shuang, JIANG Yihong

## Timing of accounting information disclosure and informed trading—An empirical study on the time gap between annual and 1<sup>st</sup> quarterly financial reports and extra abnormal trading volume

© Higher Education Press and Springer-Verlag 2009

**Abstract** Considering the cost of capital, systematic risk and the probability of being monitored and punished, informed traders are most likely to conduct informed trading at the small time gap between the disclosure of annual report of year  $t$  and 1<sup>st</sup> quarter reports of year  $t+1$  because the gap is the best and safest time for informed trading. Meanwhile, due to the high cost and risks of informed trading, traders need huge trading volumes to gain abnormal returns. Based on these characteristics of informed trading, a research sample and a control sample are found for this paper. The former refers to companies with loss annual report in year  $t$  and profit-making 1<sup>st</sup> quarter financial report in year  $t+1$  in tandem. The latter refers to companies announced loss in the previous year and profit-making 1<sup>st</sup> quarter financial report in year  $t+1$  simultaneously or companies with loss annual report in the year  $t$  and loss 1<sup>st</sup> quarter financial report in year  $t+1$  in tandem. Results confirm the existence of informed trading by measuring “extra abnormal trading volume”. Therefore, authors suggest that a good disclosure policy should not only consider the timeliness and accuracy of the financial reports, but also the overall information disclosure process to prevent potential informed trading.

---

Translated and revise from *Zhongguo Kuaiji Pinglun* 中国会计评论 (China Accounting Review), 2008, 6(2): 207–222

---

XUE Shuang (✉)

Institution of Accounting and Finance, Shanghai University of Finance and Economics,  
Shanghai 200433, China  
E-mail: xuesh@mail.shufe.edu.cn

JIANG Yihong

Institution of Accounting and Finance, Shanghai University of Finance and Economics,  
Shanghai 200433, China  
E-mail: yhjjiang@mail.shufe.edu.cn

**Keywords** disclosure gap, informed trading, extra abnormal trading volume

**摘要** 考虑到资金成本、市场的系统性风险和被监管的可能性,内幕交易者最可能利用两个相隔时间很短的定期报告进行内幕交易。因为这种交易模式最隐蔽,最安全。同时,因承担了高成本和高风险,内幕交易需要巨额的交易量才能获得超额收益。利用内幕交易的这些特征,找到了极好的研究样本(年报亏损下年首季报盈利且年报首季报先后公布的样本)和控制样本(年报亏损下年首季报盈利但年报首季报同时披露的样本或者年报亏损下年首季报仍然亏损且年报首季报先后公布的样本),通过异常的超额交易量验证了内幕交易的存在。研究表明,在信息披露监管政策中,不仅要考虑信息披露的及时性和充分性,还应考虑信息披露过程是否为内幕交易提供了可乘之机。

**关键词** 披露时差,内幕交易,异常超额交易量

---

## 1 Introduction

Generally, market responses negatively to a listed company's loss announcement and positively to its announcement of "loss-reversal". If the loss-announcing report is disclosed prior to the announcement of "loss-reversal", some "prophets" are able to buy stocks at a lower price on the day of loss announcement and then resell the shares on the day of "loss-reversal" announcement, gaining abnormal returns within a short time.

Are these "prophets" informed traders? Very probably.

First of all, some insiders of listed companies might already be aware of the fact that "loss in the first report period and gain in the second one". Managers in some listed companies also might arrange the above announcement dates intentionally to create golden chances for informed traders to profit from the time gap. In doing so, informed trading demonstrates a tendency of maximizing returns and shortening transaction time.

Second, trading volume on the day of information disclosure is usually larger than that of common trading days. By buying shares at comparatively lower price on the day of loss announcement and reselling these shares on the day of "loss-reversal" announcement, potential informed traders are able to gain abnormal returns. More importantly, they can cover the abnormal trading volume so as to distract attention from the market, avoid penalty from the regulatory bodies and minimize risks of informed trading.

In addition, accounting period is divided up artificially and inconsistent with production/operating cycle. As such, a company may suffer loss in one production/operating cycle. However, by dividing the cycle into two report periods, a company might be able to announce that it made loss in the first period

and made a profit in another. This defect in determining accounting period makes it even more convenient to cover preparation for informed trading (such as earnings management, manipulation of disclosure time, etc.), further reducing the regulatory risks of informed trading.

Finally, informed traders can also take advantage of the defects in system of accounting information disclosure. For example, both Shanghai and Shenzhen stock exchanges require that all listed companies shall disclose their annual reports within a period of 120 days at the end of the previous year, while quarterly reports shall be disclosed within a period of 30 days at the end of a quarter. Therefore, managers intended for informed trading are likely to disclose both loss-announcing annual report (issued earlier) and “loss-reversal” 1<sup>st</sup> quarter report (issued later) in April to shorten the period of informed trading, reducing to the full possible systematic risks and opportunity costs of used for informed trading.

As above, informed traders can maximize “returns” and minimize regulatory risks by buying shares on the date of loss announcement (annual report of the previous year) and reselling these shares on the date of profit announcement (1<sup>st</sup> quarter financial report). Defects in system of accounting information disclosure make it possible for informed traders to arrange as closely as possible the announcement day of loss and profit. Therefore, informed traders are likely to use the inherent limitations in China’s accounting system to cover their informed trading behaviors. In addition, the usually soaring trading volume on the day of loss or profit announcement makes it more difficult to trace informed trading. We thus argue that the accounting information disclosures characterized by loss previous year’s annual report followed shortly by profit 1<sup>st</sup> quarter financial report in the current year are very likely a herald of informed trading.

---

## **2 Informed trading and “extra abnormal trading volume”**

The high risks of manipulating the disclosure time of accounting information and selling insider information are compensated by a huge amount of charge for insider information. Therefore, the price of insider information is usually high. In addition, buying and selling large volume of shares within a period of time make the share price fluctuate to informed traders’ disadvantage. As a result, the abnormal return rate is usually not very high. Given that the return rate is fixed, informed traders have to buy large volume of shares and sell them at a much higher price so as to gain satisfactory profit after paying expensive insider information. In other words, informed trading tends to boost trading volume within a short time.

Except abnormal trading volume, in order to induce other investors to follow

suit, informed traders may also conduct false sales on target shares. As a result, trading volume may be further increased. Allen and Gale (1992) proved theoretically that one trader's buying and selling shares in large volumes tend to induce other investors to believe that he/she has insider information and follow his/her. In this way, manipulators of trading are more likely to gain positive returns.

Of course, to maximize their returns, informed traders are motivated to buy and resell as many as shares as possible, resulting in soaring trading volume.

As above, if informed trading exists (particularly those for short-term arbitrage purposes), the trading volume on the announcement day with informed trading will be much bigger than the trading volume on the announcement day without informed trading. Drawing on this assumption, this paper uses the mean of daily share turnover rate in the 60 trading days prior to the announcement of annual report (from the 70<sup>th</sup> to the 10<sup>th</sup> trading days before the announcement of annual report) as normal trading volume. Abnormal trading volume is the trading volume on the annual report announcement day minus the normal trading volume. Extra abnormal trading volume equals the abnormal trading volume of the announcement day suspected of possible informed trading minus the abnormal trading volume of the announcement day free of informed trading. Therefore, with other factors under control, positive extra abnormal trading volume implies the existence of informed trading.

The rest of this paper is organized as follows: Section 3 reviews relevant literature, Section 4 describes sample and develops hypotheses, Section 5 contains results and analysis, and Section 6 concludes.

---

### 3 Literature review

Extant literature on informed trading can be divided roughly into two streams, one is theoretical research which attempts to explore the impacts of informed trading on different market participants by developing theoretical models; the other is empirical research. Due to data availability, the second research stream is seriously lacking. At present, empirical study on informed trading has mainly focused on the transaction behaviors of controlling shareholders or managers. In a sense, extant study on informed trading has been solely focused on informed transactions.

In the stream of theoretical study, Leland (1992) established the Rational Expectations Model, showing that informed trading damages the interests of outsiders and liquidity traders, especially under the circumstances of small investment elasticity, uncertain encashment behaviors, big fluctuation in share price, and a higher degree of risk aversion. Gerard and Nanda (1993) also

theoretically analyzed that people aware of new share issue can sell short a company's share in large volume before SEO bring down the price of additionally issued shares. They can then buy the same amount of newly issued shares to make a profit. Bagnoli and Lipman (1996) set up a model to demonstrate that in some acquisition activities, the real purpose of the acquiring company might not be to control the acquired company but to resell the latter's shares at a higher price to make a profit. Allen and Gale (1992) analyzed that by means of trade-based manipulation, such as buying and selling shares in large volume, manipulator might not need real insider information to make abnormal returns. Their study proved that a manipulator could obtain abnormal returns as long as he/she can convince other investors of his/her acquisition of "insider information".

Among empirical researchers, Meulbroek (1992) used inside-trading companies penalized by SEC in 1980–1989 as samples. He found that these companies' trading volume increased significantly prior to the announcement of important information. It showed that the additional trading volume comes from informed trading. Due to the price discovery function of informed trading, a share's price tends to go up about 40–50% during the informed trading period prior to the acquisition occurrence. Based on his study on the relationship between ownership concentration and informed trading, Demsetz (1992) found that the more concentrated a company's ownership structure, the more vulnerable the company to informed trading. Moreover, ownership concentration is also positively related to firm-specific risks. Demsetz proved that big shareholders are willing to accept higher firm-specific risks in exchange of gaining insider information to make abnormal profits for the latter can well compensates the former. Seyhun (1992) found that informed trading happened in the past 12 months can explain about 25% of a share's rate of return in the next 6 months, and about 60% in the next 12 months, even after controlling for macro variables, industrial variables and company characteristic variables (e.g., cash flow).

Lu and Li (2005) studied listed companies panelized by the China Securities Regulatory Commission (CSRC). They found that manipulated shares tend to have higher turnover rate, showing that these shares have larger trading volume in unit time.

---

## 4 Research design and hypotheses

Several problems are to be solved before we study informed trading. First, insider information plays a critical role in informed trading. Market response varies with different information: "good news" leads to positive market response and "bad news" negative response. Some information may lead to uncertain

market response, such as change of ownership, company restructuring and personnel change in top managerial team, etc. Therefore, we need to first of all define what are good news and bad news. Second, we need to choose accurately the informed trading date to avoid Type II error in statistics. Third, informed traders prefer to arbitrage as quickly as possible because the longer the trading period, the bigger the trading uncertainty, the higher the systematic risks. For example, if there is an overall decline in market during informed traders' share holding, the positive effects of informed traders' information on share price might not be able to counteract the negative effect imposed by market decline. Also, to researchers of informed trading, short observation window also helps to reduce noise influences. Fourth, data of control samples or matching samples shall be easy to be collected. Therefore, ideal samples shall be those characterized by clearly defined information type (good or bad), explicit announcement date, short time gap between bad and good disclosure, and easily available control sample.

Luckily, we find a super sample in Chinese capital market which can meet the above requirements simultaneously, that is, the listed companies characterized by a loss-making annual report in the previous year and profit-making 1<sup>st</sup> quarter report in the current year, in tandem.

First of all, earnings in annual or quarterly report can be used to accurately predict an announcement is good news or bad news. Starting from Ball and Brown (1968), many researchers have already proved that companies with a positive unexpected earnings tend to be accompanied by positive abnormal market return, and vice versa (e.g., Beaver, Clarke and Wright, 1979; Beaver, Lambert and Morse, 1980; Brown, 1970; Firth, 1981; Foster, 1975, 1977; Watt, 1978; Zhao, 1998, 2000; Chen, Chen and Liu, 1999; Wu, Li and Chen, 2001; Xue, 2001). In comparison with these studies, we define good and bad news in a different way in accordance with CSRC's *Notice on Regulation of Share Issues and Listing in Shanghai and Shenzhen Stock Exchange and Suspending and Terminating the Listings of Loss-making Listed Companies Implementing Procedures (Revised)* and other relevant regulations and rules.<sup>1</sup> Specifically, we use profit or loss to define "good" and "bad" news. The reasons are: (1) it is definitely bad news if a company made profit in the previous year and makes loss in the current year; (2) it is bad news if a company makes loss in two successive years for companies make loss in two successive years face "special treatment". Therefore, even if the current year's loss is smaller than the previous year,

---

<sup>1</sup> See CSRC's *Notice on Regulation of Share Issues and Listing in Shanghai and Shenzhen Stock Exchange Rules on Processing the Particular Transfer of Stocks of Listed Companies, Suspending and Terminating the Listings of Loss-making Listed Companies Implementing Procedures (Revised)*.

market might still response negatively as its possibility of delisting increases (Xue, 2001, 2005); So, if a company made loss in the previous year and it announced loss again in the 1<sup>st</sup> quarter report in the current year, the news is also definitely bad news; (3) the news is good if a company made loss in the previous year and make a profit in the 1<sup>st</sup> quarter report in the current year since it is a signal of loss-reversing.

Second, another benefit of selecting listed companies' regular reports as a source of insider information is that it is easy to confirm the announcement dates, as required above.

Third, the time gap between disclosure of annual report of the previous year and 1<sup>st</sup> quarter report in the current year is small. As above, the deadline of the previous year's annual report is the 120<sup>th</sup> day after the end of the previous accounting year (from January 1 to April 30).<sup>2</sup> The required disclosure period of 1<sup>st</sup> quarter report is from April 1 to 30.<sup>3</sup> As the contents of annual report need to be audited, most listed companies choose to disclose their annual reports in March or April. The small disclosure time gap between the two reports makes it possible for informed traders to arbitrage.

Finally, if informed trading occurs on the same day of report disclosure, it will be more difficult to collect evidence based on trading volume. The reason is that other investors might comprehend the news differently, leading to higher trading volume. Therefore, we need to find a way to separate the abnormal trading volume caused by informed traders from that of non-informed traders. One solution is to find a proper control sample. If there are cases in which financial reports are disclosed but will not lead to informed trading, we can use these cases as control samples to solve the above problem. It is another reason we choose to study annual report of the previous year and 1<sup>st</sup> quarter report in the current year. Since there is one overlapping month between the two disclosures, it is possible to disclose both reports on the same day in April. As "good" and "bad" news are released on the same day, it is difficult to judge price trend and informed trading is not likely to happen. However, as new reports are disclosed, "normal" abnormal trading volume will still exist, making these cases ideal control samples for our study.

Another control samples we use is those companies which announce "bad news" in both reports and the two reports are disclosed in tandem. As both reports announce losses, these companies' share price will decline continuously, leaving informed traders no chances for profiteering.

The screening process of potential samples and control samples is described in

---

<sup>2</sup> See the *Compilation Rules for Information Disclosure by Companies Offering Securities to the Public* (No.2).

<sup>3</sup> See the *Compilation Rules for Information Disclosure by Companies Offering Securities to the Public* (No.13).

Table 1. CSRC requires all Chinese listed companies to disclose quarterly financial reports since 2002. From 2001 to 2003, there were 462 companies reported losses in their annual reports. Among them, 155 reported “loss-reversing” in their following 1<sup>st</sup> quarter report in the next year (“loss-gain” companies for short). After eliminating those that did not disclose their annual reports in April and those delisted soon after their disclosure of annual reports, 125 firm-year remains. Out of these 125 samples, 79 chose to disclose their annual report and 1<sup>st</sup> quarter report in tandem, 46 disclosed the two reports on the same day. In addition, among the 307 companies disclosed loss-making annual and 1<sup>st</sup> quarter reports (“loss-loss” companies for short), 156 chose to disclose their annual report and 1<sup>st</sup> quarter report in tandem.

**Table 1** Screening process of potential samples

Screening process	No. of companies
“Loss-gain” 1. Total number of “loss-gain” companies in 2001–2003 companies	155
2. Elimination of “unqualified” companies	30
Including (1) Companies did not disclose their annual reports in April	24
(2) Companies delisted after disclosure of their annual reports	6
3. Sample companies	125
Including (1) Sample companies disclosed the two reports in tandem (samples to be tested I)	79
(2) Sample companies disclosed the two reports on the same day (control sample I)	46
“Loss-loss” 1. Total number of “loss-loss” companies during 2001-2003 companies	307
2. Elimination of “unqualified” companies	151
Including (1) Companies did not disclose their annual reports in April	48
(2) Companies delisted after disclosure of their annual reports	13
(3) Sample companies disclosed the two reports on the same day	90
3. Sample companies disclosed the two reports in tandem (control sample II)	156

Will “good news” and “bad news” affect share prices as stated in literature? The abnormal rate of returns of the “loss-gain” sample companies on the date of annual and 1<sup>st</sup> quarter report disclosure are presented in Table 2. As shown, the abnormal rate of returns on the day of annual report disclosure is  $-1.2\%$ , while the rate on the day of 1<sup>st</sup> quarter report disclosure is  $2.4\%$ . Therefore, if one buys shares on the announcement day of annual report and resells them on the announcement day of 1<sup>st</sup> quarter report, he/she gains abnormal rate of returns amounting to  $3.6\%$  within a short time. In other words, the time gap creates a good chance for informed trading.

**Table 2** Comparison of abnormal rate of return of the “loss-gain” companies when they disclose the two reports in tandem or disclose the two reports simultaneously

Trading day	Disclosure type	Report type	Mean	Median	Comparison of the abnormal rate of return between “in-tandem” firms and “simultaneously” firms.	
					<i>T</i>	<i>Z</i>
-1	Disclose in tandem	Annual report	0.002	0.000	0.89	0.73
		Quarterly report	0.003	0.005	0.98	0.88
	Disclose simultaneously		-0.002	0.001		
0	Disclose in tandem	Annual report	-0.012	-0.006	3.05***	3.14***
		Quarterly report	0.024	0.017	1.97**	1.37
	Disclose simultaneously		0.015	0.012		
1	Disclose in tandem	Annual report	-0.003	-0.008	1.86*	2.74***
		Quarterly report	0.002	0.001	1.54	1.09
	Disclose simultaneously		0.005	0.001		

For the “loss-gain” companies, if the two reports are disclosed in tandem, informed traders aware of the information of loss-reversing 1<sup>st</sup> quarterly report can buy their shares in large volume when share prices fall upon the announcement of loss annual reports and sell them when share prices go up upon the announcement of profit-making 1<sup>st</sup> quarter reports. However, if the two reports are disclosed simultaneously, there will be no time gap for profiteering. Growth in trading volume of these stocks is attributed to investors’ different expectation. For the “loss-loss” companies, if the two reports are disclosed in tandem, informed traders know that the contents of the following 1<sup>st</sup> quarter report. Since there is no short-sale mechanism, they would not conduct informed trading. Therefore, we develop the following hypotheses:

**H1** For the “loss-gain” companies, if they disclose the two reports in tandem, there will be positive extra abnormal trading volume on the announcement day of the two reports. In other words, the trading volume of these “loss-gain” companies on the two announcement days will be higher than the trading volume on the announcement day of “loss-gain” companies whose disclose the two reports simultaneously.

**H2** If companies disclose the two reports in tandem, there will be positive extra abnormal trading volume for “loss-gain” companies on the announcement day of the two reports. In other words, the trading volume of the “loss-gain” companies on the two announcement days will be respectively higher than that of

the “loss-loss” companies.

---

## 5 Empirical test

### 5.1 Univariate test

We use the mean adjustment method to calculate abnormal trading volume. The equation is as follows:

$$AV_{it} = V_{it} - \text{mean}(V_i)$$

$$CAV_i = \sum_{t=-1}^1 AV_{it}$$

$V_{it}$  is the turnover rate of share  $i$  on day  $t$ .  $\text{mean}(V_i)$  is the average turnover rate of share  $i$  in the 60 trading days prior to reports announcement (starting from the 70<sup>th</sup> to 10<sup>th</sup> trading day prior to report announcement). It is used to measure normal trading volume. By subtracting the normal trading volume from the turnover volume in the event window, we can get  $AV_{it}$ , the abnormal trading volume.  $CAV_i$  (cumulative abnormal trading volume) is the sum of all abnormal trading volume in the event window.

Extra abnormal trading volume is defined as follows:

$$EAV_{it} = AV_{it} - MAV_{it}$$

$$CEAV_i = CAV_i - MCAV_i$$

$EAV_{it}$  (extra abnormal trading volume) equals the  $AV_{it}$  of sample companies on day  $t$  minus the  $MAV_{it}$  (matching abnormal trading volume) of control sample companies on the same day.  $CEAV_i$  is the cumulative extra abnormal trading volume in the event window.

$$V_{it} = \alpha_i + \beta V_{mt} + \varepsilon_{it}$$

$$AV_{it} = V_{it} - (\hat{\alpha}_i + \hat{\beta} V_{mt})$$

Market model method can also be used to calculate  $AV_{it}$ .<sup>4</sup>

---

<sup>4</sup> Market model can also be used to calculate abnormal trading volume. But market model for abnormal trading volume calculation is slightly different from the market model for abnormal return in that the latter is based on the solid theoretical foundation of CAPM. Therefore, we use the easier-to-understand mean adjustment model to calculate abnormal trading volume and use market model to test the robustness of the conclusion. Of course, “trading volume”, as it is commonly called, is in effect abnormal turnover rates.

$$V_{it} = \alpha_i + \beta V_{mt} + \varepsilon_{it}$$

$$AV_{it} = V_{it} - (\hat{\alpha}_i + \hat{\beta} V_{mt})$$

$V_{mt}$  is the average market trading volume on day  $t$ . It equals the total number of shares traded in the market divided by the total number of circulation shares. Other variables are the same as above. Table 3 compares the abnormal trading volumes of the “loss-gain” companies disclosed the two reports in tandem with those “loss-gain” companies disclosed the two reports simultaneously.

**Table 3-A** Comparison of abnormal trading volume of the “loss-gain” companies disclosed the two reports in tandem with “loss-gain” companies disclosed the two reports simultaneously

Trading day	Disclosure type	Report type	Mean	Median	Comparison of the abnormal trading volume between the two disclosure types	
					<i>T</i>	<i>Z</i>
-1	In tandem simultaneously	Annual <i>AV1</i>	0.481	0.061	-1.07	-0.51
		Quarterly <i>AV2</i>	0.099	-0.010	-2.11**	-2.45***
		<i>MAV</i>	0.504	0.240		
		Annual <i>EAV1</i>	-0.023	-0.18		
		Quarterly <i>EAV2</i>	-0.405	-0.25		
		<i>EAV1/MAV</i>	-5%	-75%		
		<i>EAV2/MAV</i>	-80%	-104%		
0	In tandem simultaneously	Annual <i>AV1</i>	1.061	0.513	4.32***	3.22***
		Quarterly <i>AV2</i>	1.026	0.305	2.82***	2.22**
		<i>MAV</i>	0.487	0.200		
		Annual <i>EAV1</i>	0.574	0.313		
		Quarterly <i>EAV2</i>	0.539	0.105		
		<i>EAV1/MAV</i>	118%	157%		
		<i>EAV2/MAV</i>	111%	53%		
1	In tandem simultaneously	Annual <i>AV1</i>	0.409	0.189	0.12	<b>1.78*</b>
		Quarterly <i>AV2</i>	0.711	0.172	1.04	1.50
		<i>MAV</i>	0.377	-0.092		
		Annual <i>EAV1</i>	0.032	0.218		
		Quarterly <i>EAV2</i>	0.334	0.260		
		<i>EAV1/MAV</i>	8%	-		
		<i>EAV2/MAV</i>	89%	-		

Note: *AR* stands for annual report; *QR* stands for quarterly report. The same in tables below.

As shown in Table 3-A, the mean of abnormal trading volume for sample companies which disclose the two reports in tandem (Type One) is 1.061

(median is 0.513), mean of abnormal trading volume for sample companies which disclose the two reports simultaneously (Type Two) is 0.487 (median is 0.200). The abnormal trading volume of Type One on the announcement days of annual and 1<sup>st</sup> quarter reports are significantly higher than that of Type Two. The mean and median of Type One on the announcement day of 1<sup>st</sup> quarter report is 1.026 and 0.305, respectively, significantly higher than the mean (0.487) and median (0.200) of Type Two. Though there are also abnormal trading volume one day prior to and one day after the announcement of annual report in both types, the difference in means and medians in both types are not significant.

**Table 3-B** Comparison of cumulative extra abnormal trading volumes of “loss-gain” companies disclosed the two reports in tandem with “loss-gain” companies disclosed the two reports simultaneously in window [-1, +1]

Trading day	Disclosure type	Mean	Median	Comparison of the abnormal trading volume between the two disclosure type	
				<i>T</i>	<i>Z</i>
in tandem	annual ( <i>CAV</i> )	1.951	0.999	3.46***	2.54**
	quarterly ( <i>CAV</i> )	1.836	1.092	1.73*	3.89***
	simultaneously ( <i>MCAV</i> )	1.367	0.528		
	annual <i>CEAV</i>	0.584	0.471		
	<i>CEAV/MCAV</i>	43%	89%		
	quarterly window <i>CEAV</i>	0.469	0.564		
	<i>CEAV/MCAV</i>	34%	107%		

Table 3-B presents the cumulative extra abnormal trading volumes in time window [-1, +1] (i.e. the day before and the day after the announcement of the two reports). As shown, the mean and median of the cumulative extra abnormal trading volume of Type One in annual report window are 0.469 and 0.564, respectively, showing that abnormal trading volume caused by informed trading is about 40% (means) to 100% (median) to that of “normal abnormal trading volume”. Therefore, results in Table 3 support H1.

Given positive abnormal returns, the bigger the abnormal trading volume, the more returns informed traders receive. For “loss-gain” companies, informed traders will buy these companies’ shares before, on and after the day of annual report announcement. Then to resell these shares at a much higher price when these companies’ profit-making 1<sup>st</sup> quarter reports are disclosed. As such, the trading volume on both announcement days grow considerably. For “loss-loss” companies, informed trading is not likely to happen due to the lack of arbitrage opportunities. Therefore, other conditions being equal, the abnormal trading volume of “loss-loss” companies on the days of annual and 1<sup>st</sup> quarter report

announcement will be respectively smaller than that of “loss-gain” companies.

In Table 4, we compare the differences in abnormal trading volume on report announcement day between the “loss-gain” companies and “loss-loss” companies. As for differences in annual report window, the abnormal trading volume for “loss-gain” companies is significantly positive: the mean of abnormal trading volume on the announcement day of annual report is 1.061, significantly higher than that of the “loss-loss” company (0.305); the mean of cumulative abnormal trading volume in the annual report window  $[-1, +1]$  for “loss-gain” companies is 1.951, bigger than that of the “loss-loss” companies (1.077). Cumulative extra abnormal trading volume is 0.874, amounting to 81% of normal abnormal trading volume. As for differences in 1<sup>st</sup> quarter report window, the mean of abnormal trading volume for “loss-gain” companies on the announcement day of 1<sup>st</sup> quarter report is 1.026, significantly higher than that of the “loss-loss” companies (0.187). The mean of cumulative extra abnormal trading volume in the time window of  $[-1, +1]$  for “loss-gain” companies is 7.62 times bigger than “normal” trading volume.

**Table 4** Comparison of the abnormal trading volumes between “loss-gain” and “loss-loss” companies (Type One companies)

Trading day	Group	Annual report		1 <sup>st</sup> quarter report		Cumulative	
		AV(mean)	T	AV(mean)	T	AV (mean)	T
-1	PAQR <i>AV1</i>	0.481 <sup>***</sup>		0.099 <sup>*</sup>		0.580 <sup>***</sup>	
	LAQR <i>MAV</i>	0.232 <sup>***</sup>		-0.018		0.214	
	<i>EAV</i>	0.249	1.31	0.117	1.09	0.366 <sup>**</sup>	1.81 <sup>*</sup>
	<i>EAV/MAV</i>	107%		-		171%	
0	PAQR <i>AV1</i>	1.061 <sup>***</sup>		1.026 <sup>***</sup>		2.087 <sup>***</sup>	
	LAQR <i>MAV</i>	0.305 <sup>***</sup>		0.187 <sup>*</sup>		0.492 <sup>***</sup>	
	<i>EAV</i>	0.756	1.93 <sup>*</sup>	0.835	2.09 <sup>**</sup>	1.595	2.19 <sup>**</sup>
	<i>EAV/MAV</i>	248%		447%		324%	
1	PAQR <i>AV1</i>	0.409 <sup>**</sup>		0.711 <sup>***</sup>		1.120 <sup>***</sup>	
	LAQR <i>MAV</i>	0.539 <sup>**</sup>		0.044		0.583 <sup>**</sup>	
	<i>EAV</i>	-0.130	-0.40	0.667	2.54 <sup>***</sup>	0.537	1.40
	<i>EAV/MAV</i>	-24%		1 516%		92%	
[-1,+1]	PAQR <i>CAV1</i>	1.951 <sup>***</sup>		1.836 <sup>***</sup>		3.194 <sup>***</sup>	
	LAQR <i>MCAV</i>	1.077 <sup>***</sup>		0.213		1.290 <sup>***</sup>	
	<i>CEAV</i>	0.874	1.67 <sup>*</sup>	1.623	3.02 <sup>***</sup>	1.904	2.66 <sup>***</sup>
	<i>CEAV/MCAV</i>	81%		762%		148%	

Note: LAQR= loss-announcing quarterly report; PAQR=profit-announcing quarterly report.

As shown in Table 4, the means of abnormal trading volume of “loss-gain” companies (Type One) on both announcement days are significantly bigger than that of “loss-loss” companies, indicating the existence of positive and significant abnormal trading volume. These results support H2.

## 5.2 Multivariate linear regression

The above group-based testing does not control other influencing factors of trading volume. Many researchers (e.g., Beaver, 1968; Bamber, 1987; Kim and Verrecchia, 1991) argued that changes in share prices and trading volume reflect market and investor behaviors, respectively. The total trading volume is determined by differences in investor beliefs or the degree of information asymmetry. Varian (1986) and Karpoff (1986) found that trading volume is the increment function of the degree of dispersion of individual investors' expectation. In empirical study, the degree of information asymmetry can be measured with many different variables. For example, Bamber (1987) used company size as a proxy variable for degree of information asymmetry. Instead, Bamber and Cheon (1995) used the variances in analysts' forecasts as a proxy for degree of information asymmetry.

Trading volume has also something to do with the information itself. Generally speaking, the more surprises certain information brings to a market, the greater the variance in investors' understanding of the information, resulting in bigger trading volume. For example, Bamber (1987) studied 908 cases of changes in market trading volumes when quarterly accounting reports are announced. He found that unexpected earnings are significantly related to trading volume growth.

Due to lack of mature analyst forecasting system, we use the natural logarithm of a company's total assets to control the degree of information asymmetry. Generally speaking, large companies attract more attention from investors and media alike. Accordingly, the degree of information asymmetry is smaller. We thus assume that the bigger the company size, the smaller the informed trading volume. In addition, we control for the unexpected earnings in annual and the 1<sup>st</sup> quarter reports. Specifically, the unexpected earnings in annual report are the differences between the Return on Total Assets (ROA) in the present year and that of in the previous year. The unexpected earnings in the 1<sup>st</sup> quarter financial report are the differences between the ROA in the first quarter in the present year and that of in the previous year. The multivariate linear regression model is as follows:

$$CAV = \alpha_0 + \alpha_1 SAME + \alpha_2 QLOSS + \alpha_3 DROA + \alpha_4 DQROA + \alpha_5 LGTA + \varepsilon \quad (2)$$

*CAV* is cumulative abnormal trading volume. *SAME* is a dummy variable. It equals 1 for companies disclose the two reports simultaneously), and 0 otherwise. *QLOSS* is also a dummy variable. It equals 1 for loss-announcing 1<sup>st</sup> quarter financial report and 0 otherwise. *DROA* is the difference between a company's Return on Total Assets in year  $t$  and  $t-1$ . *DQROA* is the difference between a company's Return on Total Assets disclosed in its 1<sup>st</sup> quarter financial report in year  $t+1$  and that of year  $t$ . *LGTA* is the natural logarithm of a company's total assets.

The regression results of Model (2) is presented in Table 5.

As shown in Table 5-A, cumulative abnormal trading volume is used as the dependent variable. For Type One companies, *CAV* is the cumulative abnormal trading volume in the time window of annual report. Result 1 in Table 5-A considers only the influence of disclosure strategy on trading volume. *SAME* is significantly and negatively related to trading volume, showing that the abnormal trading volume in Type One companies is higher than that of Type Two companies. Result 2 in Table 5-A considers only the influence of profit or loss in 1<sup>st</sup> quarter financial report on abnormal trading volume. The coefficient of *QLOSS* is significantly negative, showing that companies with profit 1<sup>st</sup> quarter financial report have bigger abnormal trading volume than that of loss-announcing companies. In Result 3, we consider the influences of both disclosure strategy and profit/loss in the 1<sup>st</sup> quarter report. Both the coefficients for *SAME* and *QLOSS* are still significantly negative, indicating that, for Type One companies, informed traders are able to take advantages of the forthcoming profit 1<sup>st</sup> quarter report to conduct transaction in both time windows to make a "profit".

In Table 5-B, abnormal trading volume is used as the dependent variable. For Type One companies, the dependent variable is the cumulative abnormal trading volume during the 1<sup>st</sup> quarter financial report disclosure. For Type Two companies, the dependent variable is the cumulative abnormal trading volume during the annual report disclosure. As shown, the regression results are consistent with that of in Table 5-A.

In Table 5-C, we eliminate Type Two companies and retain only Type One companies. As the regression results show, all the coefficients of *QLOSS* are negative, showing that the abnormal trading volume of the "loss-loss" companies is smaller than that of "loss-gain" companies.

The multivariate linear regression results in Table 5 are consistent with the above univariate analysis results, providing further evidence to support H1 and H2.

**Table 5** Multi-regression results of Model (2)

A: Cumulative abnormal trading volume for Type One companies in the time window of annual report.

Variable	Result 1		Result 2		Result 3	
	Coefficient	<i>T</i>	Coefficient	<i>T</i>	Coefficient	<i>T</i>
Intercept <i>t</i>	-3.74	-0.70	-1.38	-0.24	-0.56	-0.10
<i>SAME</i>	<b>-0.75</b>	<b>-1.76*</b>			<b>-0.80</b>	<b>-1.87*</b>
<i>QLOSS</i>			<b>-1.08</b>	<b>-2.20**</b>	<b>-1.65</b>	<b>-2.86***</b>
<i>DROA</i>	1.33	0.90	1.36	0.92	1.12	0.76
<i>DQROA</i>	0.19	0.06	0.14	0.04	-0.28	-0.09
<i>LGTA</i>	0.26	1.00	0.14	0.50	0.12	0.45
<i>R</i> square	0.05		0.03		0.06	
Adj. <i>R</i> square	0.03		0.01		0.05	

B: Cumulative abnormal trading volume for Type One companies in the time window of the 1<sup>st</sup> quarter financial report.

Variable	Result 1		Result 2		Result 3	
	Coefficient	<i>T</i>	Coefficient	<i>T</i>	Coefficient	<i>T</i>
Intercept <i>t</i>	-9.18	-1.79*	-2.59	-0.48	-2.69	-0.50
<i>SAME</i>	<b>-1.20</b>	<b>-2.48**</b>			<b>-1.11</b>	<b>-2.26**</b>
<i>QLOSS</i>			<b>-1.33</b>	<b>-3.00***</b>	<b>-1.32</b>	<b>-2.96***</b>
<i>DROA</i>	0.61	0.43	0.16	0.11	0.19	0.14
<i>DQROA</i>	0.59	0.19	-0.43	-0.14	-0.37	-0.13
<i>LGTA</i>	0.47	1.91*	0.19	0.76	0.26	0.77
<i>R</i> square	0.04		0.10		0.11	
Adj. <i>R</i> square	0.01		0.07		0.08	

C: Regression results of Type One companies

Variable	Cumulative abnormal trading volumes in both time windows as the dependent variable		Cumulative abnormal trading volumes in the time windows of 1st quarter financial report as the dependent variable	
	Coefficient	<i>T</i>	coefficient	<i>T</i>
Intercept <i>t</i>	0.39	0.03	-3.25	-0.33
<i>QLOSS</i>	<b>-1.99</b>	<b>-1.69*</b>	<b>-1.81</b>	<b>-2.10**</b>
<i>DROA</i>	1.78	0.13	-1.44	-0.39
<i>DQROA</i>	11.09	0.19	6.67	0.17
<i>LGTA</i>	0.15	0.21	0.23	0.50
<i>R</i> square	0.08		0.14	
Adj. <i>R</i> square	0.03		0.07	

## 5.3 Robustness test

The above results of abnormal and extra abnormal trading volumes are calculated based on mean adjustment model. To guarantee the robustness of these results, we use the market model of trading volume to recalculate the abnormal and extra abnormal trading volumes. The univariate test results of H1 and 2 are presented in Table 6-A and B.

As shown, results in Table 6 are still consistent with the above two hypotheses.

In addition, we use companies age and the standard deviation of its shares' daily rate of return from the May 1 in the previous year to one day before the announcement day of annual report as proxy variables for information asymmetry. The results are consistent with the above results: both of them are insignificant. One possible explanation is that although abnormal trading volume is related to the contents of the insider information itself and the degree of information asymmetry, informed trading based on insider information has nothing to do with the degree of information asymmetry.

**Table 6** Univariate test results based on the market model of trading volume

A: Cumulative extra abnormal trading volume for "loss-gain" companies in the [-1, +1] window of report announcement day (Type One & Two companies)

Disclosure type	Events	Mean	Median	Comparison between type one and type two companies	
				<i>T</i>	<i>Z</i>
Type One	AR ( <i>CAV</i> )	1.294	0.93	3.04***	2.18**
	QR ( <i>CAV</i> )	1.451	1.132	2.05**	4.11***
Type Two	( <i>MCAV</i> )	0.872	0.528		
AR time window	<i>CEAV</i>	0.422	0.402		
	<i>CEAV/MCAV</i>	48%	76%		
QR time window	<i>CEAV</i>	0.579	0.604		
	<i>CEAV/MCAV</i>	66%	114%		

B: Comparison of the abnormal trading volumes of "loss-gain" and "loss-loss" companies (Type One)

Trading day	Groups	Annual report		First quarter financial report	
		AV (mean)	<i>T</i>	AV (mean)	<i>T</i>
[-1,+1]	Profit-announcing first quarter report <i>CAV1</i>	1.294***		1.451***	
	Loss-announcing first quarter report <i>MCAV</i>	0.842***		0.763	
	<i>CEAV</i>	0.452	2.12**	0.688	2.78***
	<i>CEAV/MCAV</i>	54%		90%	

---

## 6 Conclusion

If a listed company announces “bad news” and “good news” in tandem, market will response with negative and positive abnormal rate of return, respectively. that is, company’s share price will drop first and then go up. We believe such a disclosure time gap creates a good chance for people acquiring “insider information” to buy the company’s shares at a low price when the “bad news” is announced and resell these stocks at a higher price when the “good news” is announced. Will this fleeting arbitrage opportunity caused by information asymmetry induce some people to purchase insider information to “make a profit” or induce managers to sell these insider information by intentionally timing annual report of the previous year and the 1<sup>st</sup> quarter financial report of the present year?

In our empirical study, we choose loss-making Chinese listed companies in 2001–2003 as samples and classify these companies in accordance with the nature of their first quarter financial reports in the next year and the time these companies choose to announce these quarterly reports. We first consider sample companies characterized by loss-making annual report in the previous year and profit-making 1<sup>st</sup> quarter financial report in the current year (we call them “loss-gain” companies for short). Since these companies announced “bad news” and “good news” in tandem, people having acquired insider information could buy stocks in large volume when the annual reports are announced and resell these shares at higher prices when the quarterly report are announced. Therefore, trading volume on both announcement days would increase significantly. If the two reports are announced simultaneously, there would be no such an arbitrage opportunity for potential informed traders, the trading volume of these companies’ shares then would not increase dramatically due to the lack of informed trading. Second, for those companies announced loss-making annual report in the previous year and loss-making first quarter financial report again in the next year (we call them “loss-loss” companies for short), if the two reports were announced in tandem (one bad news after another), potential acquirers of insider information would not conduct informed trading of any type due to the lack of short-selling mechanisms in China’s securities market. Therefore, although the two reports are also announced in tandem, the abnormal trading volumes of the “loss-gain” companies on both announcement days would be respectively bigger than that of the “loss-loss” companies (what we defined as extra abnormal trading volume). The empirical test supports our hypotheses in this paper.

Under China’s present supervisory regulations for accounting information disclosure, the principles of timeliness and adequacy (e.g., detailed regulations

on the disclosure time and contents) are always emphasized. By comparison, little attention has been paid to the potential arbitrage opportunities the disclosure process might be able to provide to informed traders. One explanation may be that informed trading conducted under the cover of regularly disclosed accounting reports is more cryptic in nature, making it more difficult to be discovered by supervisory bodies or investors. This paper confirms the existence of this special type of informed trading. We thus propose that, to prevent this informed trading from prevailing, one possible way is to reduce the “information advantage” held by informed traders. For example, “loss-gain” companies can be required to announce the two reports simultaneously.

The contributions of this article are twofold: First, we provide another explanation to understand changes in trading volume. In reality, although investor do utilize changes in trading volume to help them invest, they, in most cases, only use these changes to judge whether a certain stock is manipulated by “manipulators”. It is generally believed that “manipulators” can manipulate share price in the long run. However, this paper finds evidence showing that “manipulators” can also conduct secret informed trading by utilizing the fleeting disclosure time gap between the two reports. Second, a majority of relevant extant studies have explored the impact of informed trading on trading volume by using the panelized companies as samples. Contrary to these studies, this paper attempts to uncover the informed trading from the perspective of trading volume changes. In a sense, this paper not only applies the present research findings in the field of informed trading, but also attempts to further develop the field.

**Acknowledgements** This work is supported by the National Natural Science Foundation of China (No. 70602030), Ministry of Education (MOE ) Project of Key Research Institute of Humanities and Social Science in University” (No. 08JJD630005) and the “Project 211(3)” of Shanghai University of Finance and Economics. Special thanks go to the followings for their valuable comments and suggestions in the development of this paper: anonymous reviewers, Prof. Zhu Kai, Prof. Zhu Hongjun, Prof. Xia Iijun, doctoral candidates Jiang Feng and Huang Jun from Shanghai University of Finance and Economics.

---

## References

- Allen F, Douglas G (1992). Stock price manipulation. *The Review of Financial Studies*, (5): 503–529
- Bagnoli M, Lipman B L (1996). Stock price manipulation through takeover bids. *The RAND Journal of Economics*, 27(1): 124–147
- Ball R J, Brown P (1968). An empirical evaluation of accounting income numbers. *Journal of Accounting Research*, (Autumn): 159–178
- Bamber L S (1987). Unexpected earnings, firm size, and trading volume around quarterly

- earnings announcements. *The Accounting Review*, 62(3): 510–532
- Bamber L S, Cheon Y S (1995). Differential price and volume reactions to accounting earnings announcements. *The Accounting Review*, 70(July): 417–441
- Beaver W H (1968). The Information Content of Annual Earnings Announcements. *Empirical Research In Accounting: Selected Studies*. 1968, Supplement to Vol. 6 of *Journal of Accounting Research*: 67–92
- Beaver W H, Clarke R, Wright W (1979). The Association between unsystematic security returns and the magnitude of earnings forecast errors. *Journal of Accounting Research*, 17: 316–340
- Beaver W H, Lambert R, Morse D (1980). The information content of security prices. *Journal of Accounting and Economics*, 2: 3–28
- Brown P (1970). The impact of the annual net profit report on the stock market. *The Australian Accountant*, 7: 277–283
- Demsetz H (1992). Corporate control, insider trading and rate of return. *The American Economic Review*, 76(2): 313–316
- Firth M (1981). The Relative information content of the release of financial results data by firms. *Journal of Accounting Research*, 19: 521–529
- Foster G (1975). Earnings and stock prices of insurance companies. *Accounting Review*, 50: 686–698
- Foster G (1977). Quarterly accounting data: Time-series properties and predictive-ability results. *Accounting Review*, 52: 1–21
- Gerard B, Nanda V (1993). Trading and Manipulation around seasoned equity offerings. *The Journal of Finance*, 48(1): 213–245
- Karpoff J (1986). A Theory of Trading Volume. *Journal of Finance*, 41(December): 1069–1087
- Kim O, Verrecchia R (1991). Trading volume and price reactions to public announcements. *Journal of Accounting Research*, 29(Autumn): 302–321
- La Porta R, Lopez-de-Silanes F, Shleifer A, Vishny R W (1997). Legal determinants of external finance. *Journal of Finance*, 52: 1131–1150
- La Porta R, Lopez-de-Silanes F, Shleifer A, Vishny R W (1998). Law and finance. *Journal of Political Economy*, 52: 1113–1155
- Leland H E (1992). Insider trading: Should it be prohibited? *The Journal of Political Economy*, 100: 859–887
- Meulbroek L K (1992). An empirical analysis of illegal insider trading. *The Journal of Finance*, 47(5): 1661–1699
- Seyhun N H (1992). Why does aggregate insider trading predict future stock return? *The Quarterly Journal of Economics*, 107(4): 1303–1331
- Varian H (1986). Differences of opinion in financial markets. Working paper, University of Michigan
- Watt R (1978). Systematic “abnormal returns” after quarterly earnings announcements. *Journal of Financial Economics*, 6: 127–150
- 陈晓, 陈小悦, 刘钊 (Chen Xiao, Chen Xiaoyue, Liu Zhao) (1990). A 股盈余报告的有用性研究——来自上海、深圳股市的实证证据经济研究 (Research on the usefulness of A-share companies' earnings report: Evidence from Shanghai and Shenzhen stock exchanges). *经济研究*, (6): 21–28
- 鲁桂华, 李志文 (Lu Guihua, Li Zhiwen) (2005). 庄的度量及其定价含义: 来自中国股市的经验证据 (Stock price manipulation and its price impact: Empirical evidence from Chinese stock). *中国会计与财务研究*, (2): 50–111
- 吴世农, 李常青, 陈碧华 (Wu Shinong, Li Changqing, Chen Bihua) (2001). 我国上市公司现金

- 流量的市场反应和信息含量分析 (Market response to Chinese listed companies' cash flow and analysis of information content). 首都经贸大学学报, (5): 5-13
- 薛爽 (Xue Shuang) (2001). 预亏公告的信息含量 (Information content of pre-loss reports). 中国会计与财务研究, (3): 117-176
- 薛爽 (Xue Shuang) (2005). 亏损上市公司实证研究 (An Empirical Study on Loss Firms). 上海: 复旦大学出版社
- 赵宇龙 (Zhao Yulong) (1998). 会计盈余披露的信息含量——来自上海股市的经验证据 (Information content of accounting earnings disclosure: Evidence from Shanghai Stock Exchange). 经济研究, (7): 41-50
- 赵宇龙 (Zhao Yulong) (2000). 会计盈余与股价行为. 第1版 (Accounting earnings and share price behaviors (1st edition)). 上海: 上海三联书店