

Investors' Misreaction to Subsequent Bad News

Liang-Chien Lee, Chih-Hsiang Chang, Ying-Shu Tseng

Abstract—Comparing with prior studies mainly focused on the effect of a certain event (it may be the initial announcement of bad news or the repeated announcements of identical bad news) on stock price, the aim of this study is to explore how investors react to subsequent bad news with identical content. Empirical results show that as a result of behavioral pitfalls, investors underreact to the initial announcement of the bad news (i.e., unknown bad news) and overreact to the repeated announcements of the identical bad news (i.e., known bad news).

Keywords—Subsequent bad news, Behavioral finance, Investors' misreaction, Behavioral pitfalls.

I. INTRODUCTION

IN a stock market, where information is asymmetrical and external investors' understanding of the intrinsic value of stocks lags far behind that of internal managers, supervisory authorities and internal managers attempt to unveil information about the fundamentals of listed companies through several channels in order to enhance trading liquidity and market efficiency. Earlier studies such as [1] and [2] pointed out that listed companies convey signals of intrinsic value to the market to alleviate the problem of information asymmetry. However, the validity of this method as a way of reducing information asymmetry is built upon the assumption of rational external investors. Research in behavioral finance has shown that investors might not fulfill the rationality assumption (e.g., [3]-[10]); thus, investors might misperceive the informational content.

As misperception is common among investors, many anomalies in the stock market can be readily explained. Liang [11] found that investors' cognitive limitations and overconfidence are among the causes of post-earnings announcement drift. Barberis and Thaler [12] pointed out that many anomalies identified in earlier studies are due to investors' cognitive bias and cognitive dissonance. In fact, investors' misperception of informational content is the most common phenomenon when investors respond to subsequent informational shocks. Prior studies such as [13] found that investors facing the informational shock initially underreact but subsequently overreact even though new content regarding the informational shock do not emerge. The cognitive bias model of [14] argued that investors exhibit short-term underreaction to the earnings news, but they overreact to subsequent news with

identical content. Even though the earlier studies pointed out that investors underreact and overreact to information, the question is whether the phenomenon of "underreacting initially and overreacting subsequently" also appears among investors in emerging markets (such as Taiwan's stock market) and how "identical or similar information" should be defined. Both issues require more in-depth research.

The announcement of firms listed on the Indicator 2 in the Key Financials Section (KFS) of the Market Observation Post System (MOPS) of the Taiwan Stock Exchange Corporation (TWSE) provides us with a feasible path for research concerning the definition of what investors identify as identical or similar information. The TWSE added the KFS to the MOPS on July 2, 2007 to give investors an in-depth understanding of listed companies' financial soundness and reduce information asymmetry. The publication of financial information is expected to strengthen information transparency and prevent sudden financial crises from depressing stock prices. Any company that it lists as an Indicator 2 firm is considered to be experiencing difficulties and likely to suffer a sudden financial distress. The Indicator 2 group comprises firms for which the "book value per share in the most recent financial statement is below NT\$ 10 and with a consecutive 3 years of losses." Notably, financial statements are publicly available sources of data on bad news about losses. Indicator 2 information in the KFS constitutes data that are the repeated announcement of the identical (or similar) bad news regarding losses (as the vast majority of investors will already know it). The announcement of annual losses three years prior to a company being listed as an indicator 2 firm represents the first appearance of bad news (as this news will be unknown to most investors). For example, if company A were listed as Indicator 2 on July 2, 2007 (after three consecutive years of losses and with the book value per share in the latest quarter below \$NT 10), this information would be classified as bad news known to most investors, and the financial statement's announcement in 2005 of the three years of losses prior to the Indicator 2 listing would be classified as bad news unknown to most investors.

This study explores how investors respond to subsequent bad news with identical content. This study differs from prior studies in two ways. First, this study investigates how the announcement of Indicator 2 listing in the KFS impacts investor behavior and analyzes the content of the information provided to the stock market through an announcement of Indicator 2 listing. Second, although the prior studies had investigated the effect of earnings/losses information on stock prices, they focused on the effect of the first appearance of earnings/losses information. As investors might change views after the first appearance of earnings/losses information, this study analyzes the phenomenon of Indicator 2 listing to investigate how investors change between the first appearance

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of earnings/losses information and its re-appearance. This study explores the informational content of Indicator 2 listing by investigating the abnormal returns surrounding the first, second, and third announcements of losses-related information as well as the price performance around the announcement of Indicator 2 listing.

The rest of this paper is organized as follows. The next section describes the data, methods, and research subjects. The third section presents our empirical results. Finally, conclusions and suggestions are offered based on the empirical findings.

II. DATA AND METHODOLOGIES

A. Data Sources

This study examines the formation process of Indicator 2 listing to explore the effect of the announcement of subsequent bad news with identical content. Indicator 2 listing in the KFS of the MOPS of the TWSE announces that the firm has suffered three consecutive years of losses (and is thus considered by the TWSE to be in financial distress). Therefore, information in the financial statement announcing the losses three years prior to Indicator 2 listing is likely to have been unknown, and is thus termed the first appearance of bad news in this study. The financial statement announcements during the subsequent two years and the formal announcement of Indicator 2 listing represent known bad news, and are thus termed identical or similar bad news in this study.

On July 2, 2007, 104 companies were on the Indicator 2 listing. Of these, 58 companies' stocks had stopped trading. Since the information on the stock returns of the aforementioned 58 companies after their listing as an Indicator 2 firm no longer obtains, this study uses these remaining 46 companies of Indicator 2 listing as the research subject. Each event has 46 observations, for a total of 264.

Data on the Indicator 2 firms are drawn from the KFS of the MOPS of the TWSE. Information on financial statements from 2004, 2005, 2006, and 2007 and on stock returns, market capitalization, and book values comes from the *Taiwan Economic Journal* database.

B. Event Study

This study explores whether the subsequent bad news with identical content from Indicator 2 listing results in abnormal returns for listed companies through an event study examining the effect on stock prices of four events: the first announcement of losses, the second announcement of losses, the third announcement of losses, and the announcement of Indicator 2 listing. Since [15] argued that stock price responses can be seen as the behavioral reaction of aggregate investors, one can measure the behavioral reactions of investors to the first appearance of bad news and to the re-appearance of bad news with identical or similar content by observing the abnormal returns of stocks around the occurrence of the four events.

The event study investigates whether the occurrence of an event results in abnormal changes in stock price. Liu et al. [16] argued that the market model is the simplest method of estimating the expected returns and does not differ significantly

from the results of other models. Besides the market portfolio, [17] showed that differences in size and in book-to-market (B/M) ratio could also predict stock returns. Therefore, this study estimates expected returns using the market model and the three-factor model of [17]. The event study method used in this study is described below:

- (1) Event day: This study defines the event day (*i.e.*, day 0) for the four events as the day of the first announcement of losses, the day of the second announcement of losses, the day of the third announcement of losses, and the day of the announcement of Indicator 2 listing.
- (2) Event windows: this study chooses the 20 transaction days before and after the event (*i.e.*, day -20 to day 20) as the longest event windows, and investigates the abnormal returns for the event windows with different lengths of time to examine whether the four events provide useful informational content to the stock market.
- (3) Estimation period, market model, and three-factor model: we choose the 150 to 30 transaction days prior to the event day (*i.e.*, day -151 to day -31), a total of 120 days, as the estimation period. The market model and the three-factor model of [17] are used to estimate the expected returns of individual stocks. The formulas are as follows:

$$r_{i,t} = \alpha_{i0} + \alpha_{i1}r_{m,t} + \varepsilon_{i,t}, t = -150, -149, \dots, -31, \quad (1)$$

$$r_{i,t} = \beta_{i0} + \beta_{i1}r_{m,t} + \beta_{i2}SMB_t + \beta_{i3}HML_t + e_{i,t}, \\ t = -150, -149, \dots, -31, \quad (2)$$

where $r_{i,t}$ is the returns of stock i on day t . $r_{m,t}$ is the returns of market portfolio on day t . This study uses the Taiwan Stock Exchange Capitalization Weighted Stock Index as the proxy for market portfolio. SMB_t is the difference of returns between the portfolio of small companies and the portfolio of large companies on day t (if the year-end market capitalization of a company one year prior to the event day is below the average market capitalization of all companies, the company is included in the portfolio of small companies; otherwise, the company is included in the portfolio of large companies). HML_t is the difference of returns between the portfolio of the companies with high B/M ratio and the portfolio of the companies with low B/M ratio on day t (if the year-end B/M ratio of a company one year before the event day is higher than the average B/M ratio of all companies, the company is included in the portfolio of high B/M ratio; otherwise, the company is included in the portfolio of low B/M ratio). α_{i0} , α_{i1} , β_{i0} , β_{i1} , β_{i2} , and β_{i3} are regression coefficients. $\varepsilon_{i,t}$ and $e_{i,t}$ are residual terms.

- (4) Abnormal returns (AR), average abnormal returns (AAR), and cumulative average abnormal returns (CAAR): the AR of stock i on day t ($AR_{i,t}$), the AAR of all samples on day t (AAR_t), and the CAAR of all samples during the period from day t to day $t+h$ ($CAAR_{t,t+h}$) are described as follows:

Market model:

$$AR_{i,t} = r_{i,t} - (\hat{\alpha}_{i0} + \hat{\alpha}_{i1}r_{m,t}), \quad t = -20, -19, \dots, 20, \quad (3)$$

Three-factor model:

$$AR_{i,t} = r_{i,t} - (\hat{\beta}_{i0} + \hat{\beta}_{i1}r_{m,t} + \hat{\beta}_{i2}SMB_t + \hat{\beta}_{i3}HML_t), \quad t = -20, -19, \dots, 20, \quad (4)$$

$$AAR_t = \frac{1}{n} \sum_{i=1}^n AR_{i,t}, \quad t = -20, -19, \dots, 20, \quad (5)$$

$$CAAR_{t,t+h} = \sum_{T=t}^{t+h} AAR_T, \quad (6)$$

where $\hat{\alpha}_{i0}$, $\hat{\alpha}_{i1}$, $\hat{\beta}_{i0}$, $\hat{\beta}_{i1}$, $\hat{\beta}_{i2}$, and $\hat{\beta}_{i3}$ are the estimated values of α_{i0} , α_{i1} , β_{i0} , β_{i1} , β_{i2} , and β_{i3} , respectively; n is the number of samples.

(5) Testing abnormal returns: this study adopts the t -test of Brown and Warner [18] to test whether AAR and CAAR are significantly different from zero. An estimation period of 120 days (day -150 to day -31) is used to calculate the mean and variance of AAR. The following illustrates the t -test of AAR and CAAR respectively:

- The t -test of AAR:

$$H_0 : AAR_t = 0 \\ H_1 : AAR_t \neq 0$$

$$t = \frac{AAR_t}{\sigma_{AAR}}, \text{ the degree of freedom of } t\text{-distribution is 119; } (7)$$

- The t -test of CAAR:

$$H_0 : CAAR_{t,t+h} = 0 \\ H_1 : CAAR_{t,t+h} \neq 0$$

$$t = \frac{CAAR_{t,t+h}}{\sqrt{h+1}\sigma_{AAR}}, \quad (8)$$

The degree of freedom of t -distribution is 119, where,

$$\overline{AAR} = \frac{1}{120} \sum_{-150}^{-31} AAR_t; \quad \sigma_{AAR}^2 = \frac{1}{119} \sum_{-150}^{-31} (AAR - \overline{AAR})^2.$$

III. EMPIRICAL RESULTS

A. The Effect on Stock Price When Bad News Appeared the First Time

Defining information as “known” or “unknown” is very difficult. However, stocks listed as Indicator 2 have all had three consecutive years of losses. Thus, a backward-looking method dictates that financial statements published three years prior to Indicator 2 listing are most likely to be unknown, whereas a formal announcement of Indicator 2 listing is most

likely to be known.

As Table I shows, regardless of the results of the market or three-factor model, when an Indicator 2 firm publishes the annual losses information three years before its listing, the AAR of day 0 is significantly smaller than zero, indicating that investors have significantly negative reactions when the firm first announced losses-related information. Moreover, both the market and three-factor models show that the CAARs for the event windows (0,1), (0,2), (0,3), (0,5), (0,10), and (0,20) after the announcement of losses information three years before the Indicator 2 listing are statistically significant negative values, confirming that investors have significantly negative reactions to initial bad news (the first appearance of losses-related information of firms later listed as Indicator 2 is most likely to be unknown to the market).

According to the CAARs for the event windows (1,10) and (11,20) in Table I, both the results of the market and three-factor models show that investors have sustained reactions to initial bad news; these sustained responses are mainly concentrated within 10 days after the event occurred. Thus, our empirical results show that investors might underreact to initial bad news, resulting in a sustained reaction within 10 days after the first appearance of losses-related information.

TABLE I
 THE AAR (%) ON EVENT DAY AND THE CAAR (%) FOR THE EVENT WINDOWS SURROUNDING THE FIRST APPEARANCE OF BAD NEWS

Event windows/ Event day	Market model CAAR/ AAR (t-statistic)	3-factor model CAAR/ AAR (t-statistic)	Event windows	Market model CAAR (t-statistic)	3-factor model CAAR (t-statistic)
(-20,-1)	-3.145 (-1.409)	-3.325 (-1.084)	(0,2)	-4.436 (-5.130)***	-4.562 (-3.841)***
(-10,-1)	-7.028 (-4.451)***	-7.063 (-3.257)***	(0,3)	-5.702 (-5.711)***	-5.853 (-4.267)***
(-5,-1)	-4.105 (-3.678)***	-4.320 (-2.817)***	(0,5)	-8.015 (-6.554)***	-8.448 (-5.029)***
(-3,-1)	-2.489 (-2.878)***	-2.760 (-2.324)**	(0,10)	-10.391 (-6.276)***	-11.168 (-4.910)***
(-2,-1)	-0.963 (-1.364)	-1.161 (-1.197)	(0,20)	-10.234 (-4.473)***	-10.845 (-3.451)***
0	-1.423 (-2.851)***	-1.413 (-2.060)**	(1,10)	-8.968 (-5.680)***	-9.755 (-4.498)***
(0,1)	-2.782 (-3.940)***	-2.810 (-2.868)***	(11,20)	0.157 (0.099)	0.323 (0.149)

Note: *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

B. The Effect on Stock Price When Bad News Re-Appeared

The market and three-factor model results shown in Table II indicate that, although the AAR of day 0 is insignificantly different from zero when identical or similar bad news strike the stock market a second time, the market model shows that, when a company later listed as Indicator 2 announces annual losses information two years prior to its listing (after the second appearance of losses-related information), the CAARs for the event windows (0,2), (0,3), (0,5), and (0,10) are significantly smaller than zero [the three-factor model shows that the CAAR for the event window (0,3) is significantly smaller than zero]. These results reveal that the reappearance of identical bad news (information known by the market) still provide useful

informational content to the stock market, confirming the behavioral finance argument that investors often overreact or underreact to earnings/losses information.

TABLE II
THE AAR (%) ON EVENT DAY AND THE CAAR (%) FOR THE EVENT WINDOWS SURROUNDING THE SECOND APPEARANCE OF BAD NEWS

Event windows/ Event day	Market model CAAR/ AAR (t-statistic)	3-factor model CAAR/ AAR (t-statistic)	Event windows	Market model CAAR (t-statistic)	3-factor model CAAR (t-statistic)
(-20,-1)	-2.250 (-0.812)	-1.116 (-0.382)	(0,2)	-2.327 (-2.168)**	-1.854 (-1.639)
(-10,-1)	-0.619 (-0.316)	1.135 (0.550)	(0,3)	-2.836 (-2.288)**	-2.158 (-1.652)*
(-5,-1)	-0.969 (-0.699)	-0.932 (-0.638)	(0,5)	-3.000 (-1.976)**	-2.254 (-1.41)
(-3,-1)	0.241 (0.224)	0.199 (0.176)	(0,10)	-3.526 (-1.715)*	-2.487 (-1.148)
(-2,-1)	-0.186 (-0.212)	-0.128 (-0.139)	(0,20)	-0.401 (-0.141)	0.582 (0.194)
0	-0.643 (-1.037)	-0.532 (-0.815)	(1,10)	-2.883 (-1.472)	-1.955 (-0.947)
(0,1)	-1.419 (-1.618)	-1.257 (-1.361)	(11,20)	3.125 (1.595)	3.069 (1.486)

Note: *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table I shows that, after the announcement of an Indicator 2 firm's annual losses information three years prior to being listed (in the first appearance of losses-related information), investors have a significantly negative stock price reaction to this unknown information. Table II shows that, after a firm later listed as Indicator 2 announces annual losses information two years prior to the listing (after the second appearance of losses-related information), the firm's stock still has a significantly negative abnormal return, indicating that investors have a sustained response to the reappeared bad news and have underreacted to the initial bad news.

The results shown in Tables I and II indicate that investors underreact to the first appearance of losses-related information (unknown information), but do investors overreact to the second appearance of losses-related information? Further examination of the stock price response to the third appearance of losses-related information of Indicator 2 firms is required. The market and three-factor model results shown in Table III indicate that, when identical or similar bad news strike the stock market the third time (when Indicator 2 firms announces annual losses one year before their listing), the AAR of day 0 is insignificantly different from zero, but when a firm later listed as Indicator 2 announces annual losses one year prior to listing (after the third appearance of losses-related information), the CAARs for the event windows (0,1), (0,10), (1,10), and (0,20) are significantly greater than zero. These results show that the third appearance of losses-related information for a firm later listed as Indicator 2 not only causes non-negative reaction but causes its stock to have a significantly positive abnormal return.

Overall, the results shown in Tables II and III indicate that, when investors overreact to the second appearance of losses-related information, they modify this overreaction at the third appearance of losses-related information. Table II further

shows that the stocks of the firms listed as Indicator 2 have a significantly negative abnormal return after the second appearance of losses-related information (which also proves the investors' underreaction to initial losses-related information). Table III also shows that the stocks of the firms listed as Indicator 2 have a significantly positive abnormal return after the third appearance of losses-related information (which proves investors' overreaction to the second appearance of losses-related information), providing evidence supporting the previously stated arguments (*i.e.*, investors underreact to the first appearance of losses-related information and overreact to re-appearances of losses-related information with identical or similar content).

TABLE III
THE AAR (%) ON EVENT DAY AND THE CAAR (%) FOR THE EVENT WINDOWS SURROUNDING THE THIRD APPEARANCE OF BAD NEWS

Event windows/ Event day	Market model CAAR/ AAR (t-statistic)	3-factor model CAAR/ AAR (t-statistic)	Event windows	Market model CAAR (t-statistic)	3-factor model CAAR (t-statistic)
(-20,-1)	-1.464 (-0.680)	-0.252 (-0.103)	(0,2)	0.959 (1.056)	0.901 (0.952)
(-10,-1)	-3.184 (-2.091)**	-2.678 (-1.550)	(0,3)	0.739 (0.704)	0.845 (0.773)
(-5,-1)	-0.379 (-0.352)	-0.313 (-0.256)	(0,5)	1.452 (1.130)	2.187 (1.634)
(-3,-1)	-0.589 (-0.706)	-0.552 (-0.583)	(0,10)	3.712 (2.133)**	4.588 (2.531)***
(-2,-1)	-0.305 (-0.448)	-0.286 (-0.370)	(0,20)	4.195 (1.745)*	4.560 (1.821)*
0	0.489 (0.931)	0.594 (1.087)	(1,10)	3.223 (1.941)*	3.994 (2.311)**
(0,1)	1.621 (2.185)**	1.601 (2.072)**	(11,20)	0.483 (0.291)	-0.028 (-0.016)

Note: *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

C. The Effect on Stock Prices of the Formal Announcement of Indicator 2 Listing (The Fourth Appearance of Bad News)

This study used firms listed as Indicator 2 as research subjects. As a firm is listed as Indicator 2 only after three consecutive years of losses, the announcement of such a listing represents the fourth appearance of identical or similar bad news. The view of standard finance is that identical or similar bad news appearing from the second to the fourth time should not result in a significant abnormal return on the stocks of Indicator 2 firms, as such news should have been fully reflected in the first appearance. According to behavioral finance, however, if the effect on stock prices of the fourth appearance of identical or similar bad news is in the stock price adjustment period after investors' overreaction, this bad news may cause a significantly positive abnormal return in the stock of a firm listed as Indicator 2. In addition, according to the certification effect of [19]-[22], one can argue that, since the TWSE is an institution with reputation, even if the news of Indicator 2 listing is known to investors, the certification and announcement by the TWSE will still cause this news to produce a significantly negative abnormal return in the stock prices of a firm listed as Indicator 2. Thus, we examine whether the effect on stock prices of the formal announcement of Indicator 2 listing fits any of the three assumptions above by

investigating the CAAR and AAR surrounding the formal announcement of Indicator 2 listing. The findings are shown in Table IV.

The results of the market and three-factor models shown in Table IV indicate that, apart from event window (11,20), the AAR when the formal announcement of Indicator 2 listing is made (day 0) and the CAARs for all event windows post-announcement are insignificantly different from zero, showing that information known by the market does not have a significant effect on the stock prices of Indicator 2 firms. The results of the market and three-factor models shown in Table IV also indicate that the CAARs for all event windows prior to the formal announcement of Indicator 2 listing are insignificantly different from zero, implying that, after a firm has experienced three consecutive years of losses, investors expect that it will become an Indicator 2 firm, meaning that the information is not private. Therefore, prior to the formal announcement of Indicator 2 listing, this information will not cause a significant reaction in the stock price of Indicator 2 firms.

Though the results in both the market and three-factor models shown in Table IV reveal that the announcement of Indicator 2 listing, which is information known by the market, provides no additional useful information, the second and third appearances of identical or similar bad news cause significantly negative and positive abnormal returns (respectively) on the stocks of firms later listed as Indicator 2.

TABLE IV
THE AAR (%) ON EVENT DAY AND THE CAAR (%) FOR THE EVENT WINDOWS SURROUNDING THE FOURTH APPEARANCE OF BAD NEWS (THE FORMAL ANNOUNCEMENT OF INDICATOR 2 LISTING)

Event windows/ Event day	Market model CAAR/ AAR (t-statistic)	3-factor model CAAR/ AAR (t-statistic)	Event windows	Market model CAAR (t-statistic)	3-factor model CAAR (t-statistic)
(-20,-1)	1.292 (0.334)	5.066 (1.291)	(0,2)	-1.526 (-1.018)	-1.803 (-1.186)
(-10,-1)	1.586 (0.501)	2.562 (0.923)	(0,3)	-1.204 (-0.696)	-1.663 (-0.947)
(-5,-1)	2.684 (1.387)	3.099 (1.579)	(0,5)	-0.470 (-0.222)	0.763 (0.355)
(-3,-1)	1.428 (0.953)	1.322 (0.869)	(0,10)	3.005 (1.047)	4.130 (1.419)
(-2,-1)	0.794 (0.644)	0.863 (0.695)	(0,20)	-1.631 (-0.411)	-2.531 (-0.629)
0	-0.158 (-0.183)	0.250 (0.285)	(1,10)	3.163 (1.158)	3.880 (1.398)
(0,1)	-0.553 (-0.452)	-0.370 (-0.298)	(11,20)	-4.636 (-1.698)*	-6.660 (-2.400)***

Note: *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

The effect on stock prices of the fourth appearance of identical or similar bad news shows that, because the reappearance of the bad news occurs after the second appearance, the stock price adjustment after the initial overreaction disappears due to the investors' learning. Our empirical results reveal that, when identical or similar bad news is announced the fourth time, this post-overreaction stock price adjustment disappears. Overall, Tables I-IV show evidence of underreaction to initial information and overreaction to identical or similar information reappearing among Taiwanese

investors.

IV. CONCLUSIONS

The TWSE created the KFS in the MOPS on July 2, 2007, to relieve information asymmetry between stock market investors and managers of listed companies by publishing the major financial information of listed companies. Indicator 2 listing in the KFS announces that the company is facing a serious financial distress. The key criterion of Indicator 2 listing is three consecutive years of losses. Therefore, the question of whether investors react correctly to the annual losses information of a firm later listed as Indicator 2 three years before the listing is an important issue. Standard finance and behavioral finance have different views. Unlike earlier studies mainly focused on the effect of a certain event (known or unknown news) on stock prices, this study focuses on Indicator 2 firms, which have had three consecutive years of losses, to explore investor reactions to subsequent bad news with identical content, and their cognitive differences between known and unknown information.

The empirical results indicate that investors fail to react correctly to losses-related information (including the announcements of three consecutive years of losses and the announcement of Indicator 2 listing): investors underreact to initial loss information (the annual losses announcement three years prior to Indicator 2 listing) and overreact to losses information that reappeared (the annual losses announcements two years prior to Indicator 2 listing). Both the underreaction and overreaction represent a short-term continuation in stock price, long-term reversal in stock price, and lower long-term investment risks. Investors' misreaction to subsequent bad news likely explains the short-term profitability of momentum strategy, the long-term profitability of contrarian strategy, and the mean reversion trend in stock prices.

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