

# The Investors' Reaction to Investment Rating Change Announcements

Chih-Hsiang Chang, Liang-Chien Lee, Shu-Ling Wu

**Abstract**—This study investigates the investors' behavioral reaction to the investment rating change announcements from the views of behavioral finance. The empirical results indicate that self-interest does affect the intention of securities firms to release investment ratings for individual stocks. In addition, behavioral pitfalls are also found in the response of retail investors to investment rating change announcements.

**Keywords**—Investment ratings, Behavioral finance, Self-interest, Behavioral pitfalls

## I. INTRODUCTION

THE key to profiting from investment is to have good sources of investment information and to be able to analyze the effect of particular information on stock price. Unfortunately, however, general investors (especially, retail investors) are neither equipped with the required expertise and nor are sufficiently informed and therefore, analyst's recommendations (or investment rating change announcements) are believed to influence stock price and the behaviors of investors. Studies those of Womack [1], Pruitt et al. [2], Barber et al. [3], Hong and Kubik [4], Green [5], Christophe et al. [6], and Chang and Chan [7] found that analyst's recommendations result in abnormal returns on the recommended stocks. Cliff [8] also pointed out that investors in the stock market overreact to the buy recommendation, and underreact to the hold and sell recommendations.

Although the previous literature has primarily indicated that investment rating change announcements are useful information to investors in the market, the bulk of that literature has focused on the effect of rating change announcements on recommended stock prices. In terms of the releasing process for rating change announcements made by securities firms, securities firms are information senders and other investors in the market are information receivers. However, focusing only on the reaction of stock price to rating change announcements does not give a complete picture of the intention of information senders. Dugar and Nathan [9] argued that financial incentives push institutional investors to maximize their self-interest and release investment recommendations in favor of themselves.

Michaely and Womack [10] concluded that it is more likely for analysts who have worked closely with investment banks to recommend investors to buy stocks sold by the investment banks. More recently Bradley et al. [11] and Ljungqvist et al. [12] found that analysts face striking conflicts of interest when they make investment recommendations.

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Whether information receivers are able to recognize the intention of information senders and their responses to rating information are key elements that help investors to understand the usefulness of the information content of investment rating change announcements. In particular, when there is difference in sophistication between information senders and receivers, retail investors with low sophistication may not be aware of the real intention of securities firms when they release an investment rating change for a certain stock. Shefrin and Statman [13] found that investors are influenced by psychological factors and demonstrate behavioral pitfalls, while Mikhail et al. [14] indicated that small traders are not able to understand the conflicts of interest and incentives faced by analysts when they make a recommendation. As a result, to understand the intention of information senders from the perspective of self-interest incentive and to analyze the responses from information received to investment rating information helps us to further identify the role of investment rating announcements.

The purpose of this study is to examine and analyze the reason for the adoption of investment strategies of securities firms and retail investors before and after an upgrade (downgrade) is announced. Compared to earlier studies, this study has two distinct points: first, previous literature focused on the examination of price effect influenced by investment rating change announcements and in addition to the response to stock prices influenced by investment rating change announcements, while this study further investigates the investment strategies of securities firms and retail investors before and after rating change announcements. Second, this study develops the explanation of the behaviors of securities firms and retail investors from the views of behavioral finance.

The remainder of this paper is organized as follows. In the next section, we describe the empirical methodology and data. The third section presents the empirical results. We conclude the paper in the last section.

## II. DATA AND METHODOLOGIES

### A. Data Sources and Samples

This study has two main sources. Information on investment rating changes of individual stocks is obtained from CnYes.com, while information on stock returns, trading details of securities firms and margin trading is derived from the database of the Taiwan Economic Journal. The research period of this study includes the interval from January 1, 2004 to September 15, 2006. Within this time period, there were approximately 76 entries for investment rating changes, including 58 upgrades and 18 downgrades.

### B. Event Study

This study adopts the event study to examine stock price responses around investment rating change announcements, as

explained below:

- (1) Event day: The first day when investment rating changes of individual stocks were made on CnYes.com (i.e., day 0).
- (2) Event window and estimation period: The interval between 20 days before and after the rating change announcements is the event window (i.e., from day -20 to day 20). We select the interval between 450 days to 301 days before the investment rating change announcements (from day -450 to day -301) as the estimation period for a total of 150 trading days.
- (3) Expected return and abnormal return: This study uses the market model to estimate the expected returns of stocks and calculates abnormal return as follows:

$$R_{i,t} = \alpha_i + \beta_i R_{m,t} + \varepsilon_{i,t}, \quad t = -450, -449, \dots, -301, \quad (1)$$

$$AR_{i,t} = R_{i,t} - E(\hat{R}_{i,t}), \quad t = -20, -19, \dots, 0, 1, \dots, 19, 20, \quad (2)$$

where,  $R_{i,t}$  refers to return of stock  $i$  on day  $t$ .  $R_{m,t}$  is the return of the Taiwan Stock Exchange Capitalization Weighted Stock Index on day  $t$ .  $\varepsilon_{i,t}$  is the error item of stock  $i$  on day  $t$ , and we assume  $\varepsilon_{i,t} \sim N(0, \sigma)$ .  $E(\hat{R}_{i,t})$  represents expected return of stock  $i$  on day  $t$ .  $AR_{i,t}$  is the abnormal return of stock  $i$  on day  $t$ .

- (4) Average abnormal return (AAR) and cumulative average abnormal return (CAAR): This study calculates the AAR of all samples on day  $t$  and the CAAR from day  $t$  to  $t+h$  as follows:

$$AAR_t = \frac{1}{n} \sum_{i=1}^n AR_{i,t}, \quad t = -20, -19, \dots, 0, 1, \dots, 19, 20, \quad (3)$$

$$CAAR_{t,t+h} = \sum_{j=t}^{t+h} AAR_j, \quad (4)$$

where,  $AAR_t$  is AAR on day  $t$  and  $n$  is the number of the upgraded (or downgraded) stocks.  $CAAR_{t,t+h}$  refers to CAAR from day  $t$  to  $t+h$ .

- (5) The testing of CAAR: This study adopts  $t$ -test method proposed by Brown and Warner [15] to examine whether the CAAR is significantly different from zero. The testing of CAAR is as follows:

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

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

$$t = \frac{CARR_{t,t+h}}{\sqrt{h+1} \sigma_{AAR}}, \quad \text{degree of freedom of } t \text{ distribution is 149.} \quad (5)$$

where,

$$\sigma^2_{AAR} = \frac{1}{149} \sum_{t=-450}^{-301} (AAR_t - \overline{AAR})^2,$$

$$\overline{AAR} = \frac{1}{150} \sum_{t=-450}^{-301} AAR_t.$$

### C. The Investigation on the Abnormal Buying and Selling of Securities Firms

This study uses the method of Womack [1] and Chang and Chan [7] to examine whether the abnormal buying and selling of securities firms for the rated stocks are significantly different from zero. This study uses 20 days before and after the event as the event window and intervals from day -80 to day -21 as well as from day 21 to day 80 (a total of 120 trading days) as the estimation period. The testing method for the examination of abnormal buying and selling volumes of securities firms is described below:

- (1) Abnormal buying (AB), abnormal selling (AS), average abnormal buying (AAB), average abnormal selling (AAS), cumulative average abnormal buying (CAAB), and cumulative average abnormal selling (CAAS): This study calculates the AB, AS, AAB, AAS, CAAB, and CAAS as follows:

$$AB_{i,t}^D = \frac{B_{i,t}^D}{\left( \sum_{t=-21}^{-80} B_{i,t}^D + \sum_{t=21}^{80} B_{i,t}^D \right) / 120} - 1, \quad (6)$$

$$AS_{i,t}^D = \frac{S_{i,t}^D}{\left( \sum_{t=-21}^{-80} S_{i,t}^D + \sum_{t=21}^{80} S_{i,t}^D \right) / 120} - 1, \quad (7)$$

$$AAB_t^D = \frac{1}{n} \sum_{i=1}^n AB_{i,t}^D, \quad (8)$$

$$AAS_t^D = \frac{1}{n} \sum_{i=1}^n AS_{i,t}^D, \quad (9)$$

$$CAAB_{t,t+h}^D = \sum_{j=t}^{t+h} AAB_j^D, \quad (10)$$

$$CAAS_{t,t+h}^D = \sum_{j=t}^{t+h} AAS_j^D, \quad (11)$$

where,

$AB_{i,t}^D$ : AB of securities firms on stock  $i$  for day  $t$ ;

$AS_{i,t}^D$ : AS of securities firms on stock  $i$  for day  $t$ ;

$B_{i,t}^D$ : Buying ratio of securities firms on stock  $i$  for day  $t$  and day 0;

$S_{i,t}^D$ : Selling ratio of securities firms on stock  $i$  for day  $t$  and day 0.

$AAB_t^D$ : AAB of securities firms on all upgraded (or downgraded) stocks for day  $t$ .

$AAS_t^D$ : AAS of securities firms on all upgraded (or downgraded) stocks for day  $t$ .

$CAAB_{t,t+h}^D$ : CAAB of securities firms from day  $t$  to  $t+h$ .

$CAAS_{t,t+h}^D$ : CCAS of securities firms from day  $t$  to  $t+h$ .

- (2) This study uses the  $t$ -test method proposed by Brown and Warner [15] to examine whether the abnormal buying and selling volumes of securities firms on the rated stocks are significantly different from zero. In addition, we use AAB (AAS) in the estimated period during the intervals from day -21 to day -80 as well as from day 21 to day 80 (a total of 120 trading days) to calculate the mean and the variance of  $AAB_t^D$  ( $AAS_t^D$ ), i.e.,  $\overline{AAB^D}$  ( $\overline{AAS^D}$ ) and  $\sigma_{AAB^D}$  ( $\sigma_{AAS^D}$ ).

#### D. The Investigation on the Abnormal Buying and Selling of Retail Investors

This study applies the method of Womack [1] and Chang and Chan [7] to examine whether abnormal buying and selling of retail investors for the rated stocks during an event window are significantly different from zero. Because the Taiwan Stock Exchange Corporation (TSEC) does not allow institutional investors to engage in margin trading, margin buying and redemption is treated as a proxy variable of the behavioral response of retail investors. As in the analysis of the trading behavior of securities firms, this study uses 20 days before and after the announcement day as event window and the intervals from day -80 to day -21 as well as from day 21 to day 80 (in total of 120 trading days) as the estimation period. The testing of abnormal margin buying and abnormal margin redemption is as follows:

- (1) Abnormal margin buying (AMB), abnormal margin redemption (AMR), average abnormal margin buying (AAMB), average abnormal margin redemption (AAMR), cumulative average abnormal margin buying (CAAMB), and cumulative average abnormal margin redemption (CAAMR): The AMB, AMR, AAMB, AAMR, CAAMB, and CAAMR are calculated as follows:

$$AMB_{i,t}^R = \frac{B_{i,t}^R}{\left( \sum_{t=-21}^{-80} B_{i,t}^R + \sum_{t=21}^{80} B_{i,t}^R \right) / 120} - 1, \quad (12)$$

$$AMR_{i,t}^R = \frac{S_{i,t}^R}{\left( \sum_{t=-21}^{-80} S_{i,t}^R + \sum_{t=21}^{80} S_{i,t}^R \right) / 120} - 1, \quad (13)$$

$$AAMB_t^R = \frac{1}{n} \sum_{i=1}^n AMB_{i,t}^R, \quad (14)$$

$$AAMR_t^R = \frac{1}{n} \sum_{i=1}^n AMR_{i,t}^R, \quad (15)$$

$$CAAMRB_{t,t+h}^R = \sum_{j=t}^{t+h} AAMB_j^R, \quad (16)$$

$$CAAMR_{t,t+h}^R = \sum_{j=t}^{t+h} AAMR_j^R, \quad (17)$$

where,

$AMB_{i,t}^R$ : AMB of retail investors on stock  $i$  for day  $t$ ;

$AMS_{i,t}^R$ : AMR of retail investors on stock  $i$  for day  $t$ ;

$B_{i,t}^R$ : Margin buying ratio of retail investors on stock  $i$  for day  $t$  and day 0;

$S_{i,t}^R$ : Margin redemption ratio of retail investors on stock  $i$  for day  $t$  and day 0.

$AAMB_t^R$ : AAMB of retail investors on all upgraded (downgraded) stocks for day  $t$ .

$AAMR_t^R$ : AAMR of retail investors on all upgraded (downgraded) stocks for day  $t$ .

$CAAMRB_{t,t+h}^R$ : CAAMB of retail investors from day  $t$  to  $t+h$ .

$CAAMR_{t,t+h}^R$ : CAAMR of retail investors from day  $t$  to  $t+h$ .

- (2) This study used the  $t$ -test method proposed by Brown and Warner [15] to examine whether abnormal buying and selling volumes of retail investors on the rated stocks are significantly different from zero. In addition, we used the AAMB (AAMR) of retail investors during the estimation period from day -21 to day -80 as well as from day 21 to day 80 (in total of 120 days) to calculate the mean and the variance of

$$\overline{AAMRB_t^R} \quad (\overline{AAMR_t^R}), \quad \text{i.e.,} \quad \overline{CAAMRB^R} \quad (\overline{CAAMR^R}) \quad \text{and} \quad \sigma_{AAMB^R} \quad (\sigma_{AAMR^R}).$$

### III. EMPIRICAL RESULTS

#### A. Stock Price Reaction to Investment Rating Change Announcements

This study categorized two subgroups of samples as “investment rating upgrades” and “investment rating downgrades” to understand the awareness of investors of the motivations of securities firms that announce an investment rating change. Table I indicates that stocks with rating upgrades have a positive abnormal return in all event windows. Except for the (-20,-1), (-15,-1), (1,3), (1,5), (1,10), (1,15) and (1,20) event windows with insignificant positive CAAR, the rest has significant positive values, indicating that the investment rating upgrades provide the stock market with useful information content. This enables investors to evaluate upgraded stocks with a positive attitude, resulting in positive abnormal returns at the approximate time when the upgrade announcements are made. In addition, Table I shows that before the upgrade announcements, the upgraded stocks appear to have a positive abnormal return, showing that the rating information sender (securities firms) or more mature institutional investors have already purchased upgraded stocks, and that such purchases result in earlier responses to rising stock price.

TABLE I  
THE CAAR OF RATING CHANGED STOCKS

Event Windows	Rating Upgrades		Rating Downgrades	
	CAAR (%)	t-statistic	CAAR (%)	t-statistic
(-20,-1)	0.962	0.750	-2.961	-1.299
(-15,-1)	1.882	1.694	-2.562	-1.298
(-10,-1)	1.969	2.170*	-1.761	-1.092
(-5,-1)	1.273	1.984*	-0.780	-0.684
(-3,-1)	1.431	2.880*	-0.460	-0.521
(-2,-1)	1.093	2.694*	0.088	0.122
(-1,1)	2.525	5.082*	0.153	0.173
(1,2)	1.151	2.837*	0.483	0.670
(1,3)	0.851	1.713	0.478	0.541
(1,5)	0.686	1.069	-0.748	-0.656
(1,10)	1.468	1.618	-1.188	-0.737
(1,15)	1.314	1.183	-1.859	-0.942
(1,20)	0.614	0.479	-2.311	-1.014

Note: \* Significant at the 5 percent level.

Surprisingly, there are no significant negative abnormal returns for the downgraded stock. On the contrary, Table I indicates the insignificant CAAR for all event windows of the downgraded stock and a significantly weaker stock price effect for rating downgrades than for rating upgrades. This result differs from those of previous studies. One reason may be the behavioral pitfalls of investors in the Taiwanese stock market. Retail investors constitute about 85% of the total trading volume of TSEC, so there is a more significant disposition effect and regret effect in the Taiwanese stock market, making retail investors' unwilling to sell at a loss within a short period of time. As a result, even retail investors hold downgraded stocks and continue holding at a loss to avoid bad feelings. Moreover, Table I presents that of the downgraded stocks generate negative abnormal returns (although there is no statistical significance) before the downgrade announcements. This finding indicates that securities firms or institutional investors have already made use of their information advantages and sold the downgraded stocks to avoid possible future lower prices.

#### *B. Abnormal Buying and Selling of Securities Firms on the Rating Changed Stocks around the Investment Rating Change Announcements*

If the security firms with self-interest motivation announce an investment rating change for a certain stock, this motivation should be reflected in the trading activities of securities firms toward that stock. Therefore, this study examines the abnormal buying (abnormal selling) of upgraded (downgraded) stocks conducted by securities firms before and after the rating upgrades (downgrades). Table II shows that except for the (-20,-1), (-15,-1), and (-5,-1) event windows with insignificant positive CAAB, securities firms demonstrate abnormal buying of upgraded stocks significantly larger than zero for the event windows around the investment rating upgrades (securities firms buying more of upgraded stocks). This means that driven by self-interest, when securities firms announce the rating upgrades of a stock, they may hold a positive opinion toward the future price performance of that stock, so they actively buy that stock around the upgrade announcements.

TABLE II  
THE CAAB AND CAAS OF SECURITY FIRMS FOR RATING CHANGED STOCKS

Event Windows	Rating Upgrades		Rating Downgrades	
	CAAB	t-statistic	CAAS	t-statistic
(-20,-1)	1.651	1.782	2.279	1.818
(-15,-1)	1.114	1.385	0.945	0.870
(-10,-1)	1.448	2.210*	1.140	1.286
(-5,-1)	0.873	1.884	0.269	0.429
(-3,-1)	0.874	2.435*	0.110	0.227
(-2,-1)	0.935	3.191*	0.046	0.116
(-1,1)	2.273	6.333*	0.458	0.944
(1,2)	1.772	6.048*	0.202	0.510
(1,3)	2.160	6.018*	0.050	0.103
(1,5)	2.831	6.111*	0.019	0.030
(1,10)	5.651	8.625*	-0.035	-0.039
(1,15)	6.347	7.909*	1.733	1.596
(1,20)	6.847	7.389*	1.513	1.207

Note: \* Significant at the 5 percent level.

According to Table II, securities firms have statistically insignificant abnormal selling volume of the downgraded stocks for all event windows around the investment rating downgrade announcements. In other words, securities firms did not sell significantly more downgraded stocks after the stocks had been downgraded. However, except for the (1,10) event windows with insignificant negative CAAS, the positive values of abnormal selling for the event windows in the fourth column of Table II (although statistically insignificant) indicate that the trading behavior of securities firms is not inconsistent with the signal of the bad news. Therefore, we only found weak evidence to support that securities firms sell more significantly after stocks are downgraded.

The evidence that securities firms do not sell downgraded stocks at a statistically significant level is not in contradiction with the self-interest motivation. The reasoning behind the above finding may be "the understanding of securities firms with regards to the behavioral pitfalls of retail investors." Because securities firms understand that there is a disposition effect and regret effect among retail investors, even in the short term, as negative information forces the prices of downgraded stocks to drop, retail investors will not sell their stocks at a loss. Given this behavior, securities firms need not sell downgraded stocks in the short term and can wait to sell at higher prices. Therefore, the behavior of securities firms are still motivated by self-interest.

#### *C. Abnormal Buying and Selling of Retail Investors on the Rating Changed Stocks around the Investment Rating Change Announcements*

Retail investors were selected as information receivers because they account for 85% of the total trading volume on the Taiwan Stock Market. Furthermore, TSEC regulations mandate that only natural persons are allowed to do margin trading, thus, this study investigated the margin buying and redemption of retail investors on the rating changed stocks. From Table III, all the event windows after the downgrade announcements are shown to have significantly positive abnormal margin buying. This demonstrates that retail investors treat rating upgrade

announcements only as good news for the upgraded stocks and actively increase margin buying of the stocks after the upgrade announcements. In addition, Table III shows that retail investors demonstrated more margin buying significantly prior to the time the rating upgrade announcements were made. The above result does not indicate that retail investors already know the relevant upgrade information because the upgraded stocks are usually those with good “fundamentals,” and the media often sends out good news of the upgraded stocks before the investment rating upgrade announcements. As a result, retail investors usually give high evaluations for the upgraded stocks and they tend to significantly engage in more margin buying before the investment rating upgrade announcements.

Overall, this study finds the behavioral pitfalls of retail investors in the response to upgrade announcements. Due to the tendency to believe that upgraded stocks are those with good fundamentals, good news of the stocks (such as investment rating upgrade announcements) in the market will result in a confirmation bias of retail investors that overestimates the importance of relevant information of supporting their views. In addition, retail investors commit excess optimism toward future price performance and overconfidence in their own forecasting abilities due to good news disclosures. Hence, retail investors will significantly engage in margin buying of upgraded stocks. Bauman and Miller [16] showed that the excess optimism and overconfidence trends of investors, and Daniel et al. [17] further argued that investors command both public and private information and when both correspond to each other, the overconfidence of investors will be intensified resulting in more frequent trading. Most upgraded stocks have good fundamentals and retail investors also regard companies that issue upgraded stocks as “good companies.” Thus, the representativeness heuristic, that causes retail investors to view “the stocks of good companies” to be “the good stocks” result in the active buying of upgraded stocks before the investment rating upgrade announcements.

According to Table III, the downgraded stocks have positive abnormal margin redemption for all event windows after the downgrade announcements where the (1,10), (1,15) and (1,20) event windows show significantly positive abnormal margin redemption. This reveals that retail investors are not able to judge the real motivation of securities firms that announce the investment rating downgrades of stocks. Instead, they regard the rating downgrades of stocks as bad news and engage in more margin redemption for downgraded stocks after the investment rating downgrade announcements. Hence, this result provides evidence consistent with the signal of an investment rating downgrade announcement. Notably, this result also indicates that retail investors demonstrate regret effect holding losers (downgraded stocks) too long. Because of the unwilling of realizing capital loss, retail investors do not engage in significantly greater amounts of margin redemption of downgraded stocks during the initial period [i.e., the (1,2), (1,3), and (1,5) event windows] after the investment rating downgrade announcements.

TABLE III  
THE CAAMB AND CAAMR OF RETAIL INVESTORS FOR RATING CHANGED STOCKS

Event Windows	Rating Upgrades		Rating Downgrades	
	CAAMB	<i>t</i> -statistic	CAAMR	<i>t</i> -statistic
(-20,-1)	2.562	4.040*	-0.245	-0.283
(-15,-1)	2.811	5.118*	-0.592	-0.791
(-10,-1)	2.626	5.856*	-0.784	-1.283
(-5,-1)	1.341	4.229*	-0.074	-0.171
(-3,-1)	0.728	2.964*	0.131	0.391
(-2,-1)	0.560	2.793*	0.191	0.699
(-1,1)	1.633	6.649*	0.349	1.042
(1,2)	1.093	5.451*	0.009	0.033
(1,3)	1.472	5.993*	0.102	0.305
(1,5)	2.107	6.645*	0.404	0.935
(1,10)	2.572	5.736*	1.208	1.976*
(1,15)	2.823	5.140*	1.728	2.304*
(1,20)	2.748	4.334*	2.345	2.713*

Note: \* Significant at the 5 percent level.

#### IV. CONCLUSIONS

Previous studies have primarily focused on the influence of investment rating change announcements on stock prices of upgraded (or downgraded) companies, however, the discussion on information content provided by investment rating change announcements is not only limited to the stock price effect. Unlike earlier studies, this study not only attempts to investigate the effect of investment rating change announcements on stock returns but also analyzes the motivation of information senders (securities firms) and behavioral response of information receivers (retail investors).

The empirical results reveal the significant abnormal returns around an investment rating change announcement (including both upgrade and downgrade), indicating that investment rating change announcements of individual stocks made by securities firms indeed affect the investment decisions of other investors in the market. Additionally, securities firms are influenced by self-interest motivation to announcement investment rating changes. Further, securities firms understand that retail investors will be influenced by behavioral pitfalls, so the price of downgraded stocks do not drop dramatically during the initial period after an investment rating downgrade announcement. In the end, retail investors demonstrate the behavioral pitfalls in the response to an investment rating change announcement.

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