Does the Chinese stock market trust brokerage analysts' recommendations?

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Abstract

This thesis found evidence suggesting that most Chinese brokerage analysts' revisions were leaked before announcement. Upgrade revisions were found to be more valuable in most market phases, except bear markets. Upgrade revisions can generate an average abnormal return of 1.64% in the pre-event 10 days in the normal market, and this number increases to 4.92% in the bull market. Most downgrade revisions are non-profitable except for those that have a high skip ranking.

1.0 Introduction

Sell-side analysts act as intermediaries between investors and target firms. Analysts are responsible for writing research reports based on fundamental analysis, predicting a company's earnings, and providing recommendations regarding the corresponding stock. Generally, the recommendations are categorized as a strong buy, buy, hold, sell, and strong sell. Afterwards, analysts will sell their research reports to their clients (e.g., buy-side analysts) to earn a profit. Every month, thousands of analysts' recommendations are issued, the fundamental question is whether they add value. This question is important not only for its relation to market efficiency theories but also for its relevance to the role of brokerage firms and sell-side analysts. Several researchers have examined this question with largely conflicting findings. This thesis seeks to offer new evidence in this topic by focusing on Chinese analysts' recommendations.

Several studies have concluded that the stock analysts' recommendations and revisions have investment value (e.g. Elton, Gruber & Grossman (1986), Stickel (1995), Womack (1996), Barber, Lehavy, McNichols & Trueman (2001), Jegadeesh, Kim, Krische & Lee (2004) and Crane & Crotty (2020)). Brokerage houses spend several hundred million dollars per year on stock analysis in order to convince investors that a particular stock is worth investing in. Therefore, information costs a significant amount of money, and it should be compensated. Additionally, Grossman & Stiglitz (1980) argued that because information is costly stock prices do not fully reflect all information. It implies that the market needs intermediaries (e.g. brokerage analysts) in order to detect undervalued and overvalued securities, and that they should be compensated for their services. As a result, analysts' recommendations and revisions should have investment value.

Nevertheless, some studies have found that the recommendations and revisions do not provide any information, e.g. Altınkılıc & Hansen (2009), Bradley, Clarke, Lee & Ornthanalai (2014) and Li, Ramesh, Shen & Wu (2015). These scholars believe that not all revisions serve the purpose of updating information. There may be other purposes for revisions as well. For example, brokers can generate profits by revising recommendations as the profit from revising recommendations exceeds 100 million USD per brokerage firm each year, and almost 33% of revisions are useless (Conrad, Cornell, Landsman & Rountree, 2006). Additionally, revisions may be used to promote investment banking business (Michaely & Womack, 1999), as well as improve brokerage-client relationships (Schipper, 1991). Those revisions are also consistent with the fact that brokerage firms spend a significant amount of money on analyst research every year. Altınkılıc & Hansen (2009) found that revisions and recommendations provide the same information to all investors at the same time, therefore, they may not be beneficial to a single investor. Moreover, after excluding firms with events, there are no abnormal returns found for revisions, indicating the abnormal returns are more likely to be associated with firm specific events (Altınkılıc & Hansen, 2009).

As a result, this thesis will take the lead from previous research in attempting to determine whether analyst recommendations and revisions have investment value in the Chinese stock market. Specifically, this study will evaluate how the market reacts to revisions during normal and bull markets, as well as bear markets. Furthermore, this research will identify the determinants of market response to recommendations and revisions by applying cross-sectional regression analysis.

1.1 Aims and research questions

The focus of this study is on the 50 Chinese big companies in the FTSE (Financial Times and Stock Exchange - FTSE) China A50 Index. The FTSE index is the benchmark index for investors to access China's domestic market through A shares. The companies that make up the index represent a major share (over a third) of the broader market capitalisation, their stocks are more liquid and have greater analyst following. The main research question therefore is whether Chinese brokerage analysts' recommendations have investment value. To address this research question, six hypotheses will be developed and the background of these hypotheses will be illustrated in the method.

Hypothesis 1: Brokerage analysts are more likely to issue favorable recommendations and less likely to issue unfavorable recommendations.

Hypothesis 1a: Additionally, analysts tend to issue favorable recommendations in the bull market and unfavorable recommendations in the bear market.

Hypothesis 2: Analysts tend to focus mostly on certain industries.

Hypothesis 3: "Piggyback" phenomenon exists in the Chinese brokerage analysts.

Hypothesis 4: Brokerage analysts' revisions contain information relevant to different types of markets.

Hypothesis 5: Recommendation revisions for firms with high coverage have a lower price reaction.

Hypothesis 6: Brokerage analysts make a significant contribution to price discovery.

There are several points in this thesis that are new. Firstly, this thesis examines the

relationship between coverage and price reactions among large Chinese companies. Branson, Guffey & Pagach (1998) indicated that the price reaction for lightly followed firms is larger than for heavily followed firms for small firms. However, it is unclear whether this relationship holds for large firms. Secondly, this thesis investigates the relationship between the investor sentiment and stock recommendation in the Chinese stock market. There is substantial evidence that stock recommendations and investor sentiment are positively correlated (e.g. Bagno, Clement & Crawley (2009), Kaplanski & Levy (2010), Corredor, Ferrer & Santamaría (2011)). Corredor, Ferrer & Santamaría (2011) concluded that this relationship is robust and holds in the US market and the European markets. More importantly, this thesis detects whether recommendations have information content in different markets. Thirdly, in this thesis, I investigate whether piggyback theory holds true in Chinese markets and if recommendations remain useful when firm events are excluded. Altınkılıç & Hansen (2009) found that analysts are likely to piggyback their recommendations and revisions on prior firm news. Furthermore, most of the return after the announcement can be attributed to firm events rather than the recommendation itself.

The rest of this thesis is organised as follows. Section 2 provides background information on the Chinese stock market. Section 3 reviews the literature related to the topic. Section 4 describes the research method and hypotheses. Section 5 presents the empirical results, and Section 6 concludes the thesis.

2.0. **Background of the Chinese stock market**

Stock markets in China have some unique characteristics that differ from those in other parts of the world. The purpose of this section is to assist in understanding the topic of this research by highlighting some of the special characteristics of the Chinese stock market.

2.1 Institutional investors vs individual investors

In terms of the Chinese stock market investor structure, corporate executives own most shares compared to institutional investors and individual investors. However, the percentage of shares held by corporate executives has decreased in recent years. The proportion of shares held by major shareholders and related parties decreased from 70% in 2006 to 60% in 2013 (China Securities Regulatory Commission, 2020). As of the third quarter of 2020, these numbers decreased further to approximately 57% (China Securities Regulatory Commission, 2020). In addition to the corporate executives, institutional investors made up about 20.3% of the total market capitalization and individual investors made up 22.6% in the third quarter of 2020 (China securities regulatory commission, 2020). After excluding corporate executives (free-float market capitalization), institutional investors represent 47.4% of market capitalization and individual investors represent 52.6% (China securities regulatory commission, 2020).

There are more than 150 million individual investors in the Chinese stock market, and they contribute more than 85% of the market value of the transactions, compared with institutional investors who only contribute 15% of the transactions (China securities regulatory commission, 2020). The evidence indicates that individual investors are likely to make frequent trades and concentrate on short-term investments. Additionally,

individual investors are likely to trade in small stocks (China securities regulatory commission, 2020). In contrast, institutional investors tend to invest for the long term. Investor institutionalization in the Chinese stock market is primarily driven by three factors: the development of mutual funds, the rapid development of various types of asset management products, and the continued inflow of foreign capital.

In this research, companies covered by the FTSE A50 index were selected as samples, which are all large companies. Among the big companies, institutional investors are the main shareholders, not individual investors.

2.1.1 Profit distribution: Individual investors versus institutional investors

In terms of profits, institutional investors and corporate accounts have a combined average return of nearly 18%. However, retail investors lose an average of 20% per year (China securities regulatory commission, 2020).

With respect to the profit distribution among individual investors, 99.6% of the retail investors are unable to make money, while 0.4% of the investors make profits and most of their accounts are over 10 million Chinese Yuan (1.5 million USD) (China securities regulatory commission, 2020). Comparatively, most of the institutional investors' accounts are profitable.

Therefore, the Chinese stock market resembles a game in which institutional investors take money from small and medium-sized retail investors. One of the aims of this study is to provide an empirical explanation as to why almost all individual investors are not able to gain from trading equities in the Chinese stock market.

2.2 Threshold of the short-selling

The partial short-selling mechanism in the Chinese stock market differs from that of

the American market. In Chinese markets, there are two main ways to short sell. In the first place, investors can short sell the stock index, for example, Shanghai Stock Exchange 50, CSI 300 and CSI 500. Secondly, the investors can short sell the stocks. In other words, investors need to borrow stocks from brokerage firms. However, not all stocks are eligible for short sales; only those that signed off as eligible for short-selling can be short sold. In the sample period covered in this research, only 950 of 4140 stocks can be short-sold by the end of 2020 (China securities regulatory commission, 2020). This means that most stocks are not available for short selling. Furthermore, brokers may not have a short-selling business even if the stocks are available for short-selling. In 2020, only 26 of 113 brokers were engaged in short-selling business (China securities regulatory commission, 2020). Further, the supply of securities is not always abundant, each brokerage firm holds a different quantity, and the number is generally small (China securities regulatory commission, 2020). This small number of securities is generally allocated to large fund accounts such as institutional investors, rather than to small retail investors. As a result, short selling in the Chinese stock market is hard due to limited short-selling stocks and brokers without short-selling services.

Concerning the threshold of short selling in the Chinese stock market, a minimum capital requirement of 500,000 Chinese yuan (about 80,000 USD) is required in both ways of short selling (China securities regulatory commission, 2020). Nonetheless, at the end of 2020, 58.7% of individual investors' capital was less than 100,000 Chinese yuan (about 15,000 USD), and 28.6% of individual investors' capital was between 100,000 and 500,000 Chinese yuan (China securities regulatory commission, 2020). In other words, a limitation of capital prevents 87.3% of the individual investors from short selling.

Overall, the limited stock, limited brokerage firms, and capital requirements make it

difficult to short sell in the Chinese stock market. As a result, issuing a sell recommendation for the Chinese stock is not always feasible due to the limited mechanism for short selling.

2.3 T+1 mechanism

Stock markets in most countries use a T+0 mechanism, which means that investors can sell the stocks they purchased today. In the Chinese stock market, the T+1 mechanism is used, which means that investors are unable to sell stocks purchased until the next day.

2.4 Conflict of interest between Chinese sell-side analysts and bonus

The remuneration for the sell-side analysts generally includes a base salary and bonus. According to data published by the China Securities Regulatory Commission in 2020, bonuses are almost half the base salary for sell-side analysts. It is important to note that in China, bonus payments are based on the annual earnings of brokers, not the analyst itself. Therefore, if the brokers earn a great deal of money, then the sell-side analysts can receive a greater bonus. Most Chinese brokerage firms earn their money through commissions, while some American brokerage houses receive zero commissions and earn their money by reinvesting client funds. Generally, Chinese brokerage firms receive a commission of 0.1% to 0.001% of the total value of trades. The commission will be close to 0.001% for clients with large capital, and close to 0.1% for clients with small capital. As a result, there will be a conflict of interest between analysts and their recommendations. Specifically, buy recommendations can receive the commission twice as the clients will sell the stocks in the future while sell recommendations only receive the commission once. Thus, analysts may issue buy recommendations to improve the annual performance of their brokers in order to obtain a higher bonus.

3.0 Literature Review

The purpose of this section is to provide an overview of the relevant literature chronologically, as well as report on findings regarding market reactions to analysts' stock recommendations and revisions, and on how abnormal returns might be achieved by investors.

3.1 Before the 1980s

The first academic study to test whether security analysts and their recommendations can beat the stock market was written by Alfred Cowles in 1933. The study was entitled "Can Stock Market Forecasters Forecast?"

The first section of that paper discusses whether analysts' recommendations were successful in forecasting market reactions for fire insurance companies and financial services companies during 1928-1932. In the second section, the discussion is on whether financial publications can accurately predict the future movement of stock prices. Cowles (1933) concluded that approximately 7,500 analyst recommendations failed to generate abnormal returns, therefore no investment value was generated by those recommendations. Similarly, publications like the Wall Street Journal showed little ability to predict future movements of the stock market. Cowles (1933) explained that the underperformance of these recommendations can be attributed to the exogenous effects of the 1929 financial crisis.

Surprisingly, no further study had been conducted on the predictive ability of analysts' recommendations until the 1960s. Colker (1963) used the S&P425 (industrials part of the original S&P500) as a benchmark to figure out the market reaction to the recommendations published in the Wall Street Journal during the period 1960-1961. He

found that recommendations made by professionals performed slightly better than the market. Nevertheless, he pointed out that professional securities dealers are either not capable of transforming their available information into accurate recommendations, or their best projections were not accepted by the market.

Logue & Tuttle (1973) analyzed top brokerage firms' recommendations in 1970 and 1971 by using data from WST (Wall Street Transcript), which was considered to be the most reliable data source at that time. According to their findings, brokerage firms' recommendations did not produce an abnormal return. In addition, they concluded that the advice received from sell-side analysts was more valuable than other types of advice due to the fact that these stocks tend to drift significantly after 3 months and 6 months after the event.

Bidwell (1977) analyzed the recommendations of 11 brokerage firms using a beta-adjusted benchmark and found that these recommendations did not yield abnormal returns. In contrast, Groth, et. al. (1979) examined all recommendations made by one firm from 1964 to 1970 and found that excess returns are much higher before recommendations are given.

3.2. 1980-1990

Before 1980, it was not possible for researchers to determine whether recommendations had investment value systematically and unbiasedly. In the first place, the lack of a complete and consistent database presents a significant challenge to find samples which are not subject to survival biases.

There were two papers describing analyst recommendations that are considered to be notable in the 1980s. Dimson & Marsh (1984) collected personal forecasts of stock

returns from major UK brokerage firms through a UK investment manager. Due to the fact that the plan to conduct this study was made prior to the collection and analysis of data, this study did not exhibit ex-post selection bias. Data included 4,187 annual forecasts with 206 stocks issued by 35 different brokers in 1980-1981. Instead of doing the traditional event study, the authors focused on the relationship between predicted return and real return. Dimson & Marsh (1984) found that analysts can identify winners from losers, although they may have been overconfident to some degree. The expected returns of the five quintiles were 18%, 8%, 3%, -1%, and -10%%, respectively, however, the actual returns were 4.5%, 4.4%, 1%, 0% and -3.6%. In this case, analysts can successfully predict the direction, but analysts tend to overestimate high forecasts and underestimate low forecasts.

Elton, Gruber & Grossman (1986) analyzed a comprehensive dataset including 720 analysts from 33 different broker houses during 1981-1983. The study's target sample consisted only of large companies with an average of three analysts coverage. The data includes the end-of-month ratings made by sell-side analysts on a 1-5 scale. Interestingly, almost half of the ratings (48%) were buys. In contrast, only a few of the ratings (2%) were sell recommendations. There was an average variation of 11% in ratings every month.

Elton, Gruber & Grossman (1986) found that ratings increases, in particular to the most favorable rating (1), contributed to positive abnormal returns of 3.43% within two months of being announced. Conversely, a decrease in rating, particularly to the lowest rating of (5), contributed to a negative abnormal return of -2.26%. Despite the fact that the data is comprehensive, the major issue with this study is it only focuses on monthly returns. Stock markets fluctuate continually and react rapidly to changing information. In this case, it is not convincing to only focus on the monthly return. Due to the lack of

daily returns, the tests were weaker in analyzing the response to recommendation changes.

3.3 1990-2000

During the 1990s, research on brokerage analysts' recommendations took on a new dimension. Specifically, the researchers used much larger databases and focused on the daily abnormal returns to increase the accuracy of the findings. Moreover, post-1990 research started to include more information into event studies, for instance, earning release dates.

Stickel (1995) analyzed a large data set consisting of 8790 buy recommendations and 8167 sell recommendations from 1988 to 1991. The data comes from Zacks Investment Research, which attempted to collect brokerage analysts' recommendations from multiple brokerage firms. A total of 1179 stocks were covered by 1510 brokerage analysts from approximately 80 brokerage firms. Stickel (1995) reported that buy recommendations result in an average positive market reaction of 1.16%, whereas sell recommendations are related to an average price decrease of -1.28% during the (+5,-5) window. Additionally, Stickel (1995) investigated the determinants of stock performance arising from stock recommendation, including the rank of recommendation revisions, the brokerage firm coverage, the size of the company, the analyst's reputation and recommendation strength (strong buy, strong sell). He showed that an upgrade to strong buy or a downgrade to strong sell is associated with greater market reaction. Furthermore, the evidence shows more rank skips are likely to have a greater impact on stock performance. In addition, bigger brokerages tend to have a bigger impact on stock prices. Moreover, smaller companies have a greater response to recommendations than larger companies.

Stackel's paper has one big weakness: the accuracy of the database. Zacks investment research collected information artificially and sometimes cannot identify the exact date of changes to recommendations. Womack (1996) found Zacks typically records recommendation changes a few days or even weeks after informative announcements. In this case, Womack (1996) used another database, called First Call. First Call is a real-time database that records all research report contents from U.S. brokers. Researchers track any changes in a recommendation by using keyword searches (strong sell, sell, hold, buy and strong buy).

Womack (1996) analyzed a relatively more accurate and larger data set from First Call that included 1573 changes to recommendations in 822 different companies. Womack (1996) categorized 1,573 analysts' recommendations into four groups: add-to-buy, remove-from-buy, add-to-sell, and remove-from-sell. Interestingly, more than 80% of recommendations were for well-known and large companies, and over 87% were buy recommendations. In other words, brokerage analysts tend to focus on the big companies and are less inclined to issue sell recommendations. Womack (1996) found that stocks added to the buy category have an average return of about 3% during the 3-day window, whereas those added to the sell category have an average return of -4.50%. It means markets react more strongly to sell recommendations than buy recommendations. Womack (1996) found that post-recommendation abnormal returns do not mean-revert to the mean. Specifically, after one month, stocks that add to buy have experienced an excess return of 2% on average. Interestingly, the excess return for both post-3 months and post one month is the same. While for stocks that add to sell have experienced an average excess return of -9% after 6 months. In this case, Womack (1996) concluded that information search costs must yield a return and brokerage analysts' recommendations have a significant impact on stock market performance.

It is worth noting that Womack's paper has several advantages. Firstly, the use of First Call helps identify the date of recommendation changes. Secondly, unlike the previous research, Womack's research adjusts for size, industry, and makes use of the Fama-French three-factor model, which makes the results more reliable.

Following Womack, Juergens (1999) used the same database — First Call to determine the investment value of brokerage analysts' recommendations. While Womack (1996) focused only on the recommendation changes which added or removed from the favorable or least favorable category, Juergens analyzed all types of categories. Additionally, Juergens (1999) was not only concerned with the daily return, but also with the intraday return.

Juergens (1999) examined 3679 recommendations for 208 companies operating in the computer sector from 1993 to 1996. Jurgens (1999) observed an increase in recommendations over the course of the sample. Specifically, there were 105 recommendations in 1993, 968 recommendations in 1994, and 1575 commendations in 1995. Like Womack's findings, most brokerage analysts are inclined to issue a buy recommendation (56%), and only a minority (3%) recommend selling the stock. Additionally, most of the recommendations oscillate between hold, buy and strong buy. Regarding the CAR (cumulative abnormal return), Juergens (1999) indicated that stocks added to the buy category have an average return of about 4.14% during the 3-day window whereas those added to the sell category have an average return of -5.39%, which is of greater magnitude than reported by Womack. It seems that the market reacts more significantly to the recommendations given to computer-related firms. With respect to intraday returns, Jürgens (1999) calculated intraday returns for every 15-minute interval in two hours prior and following the release of the recommendation. The results indicate that positive recommendations generate returns of 0.55%, while

negative recommendations generate returns of -1.27%. It suggests that the brokerage analysts' recommendations were able to generate intraday investment returns.

3.4 2000-2010

Research after 2000 becomes more realistic and diversified. Researchers started considering transaction costs and using different strategies to get closer to real world applications.

Barber, Lehavy, McNichols & Trueman (2001) obtained data from the Zacks database, including more than 360,000 recommendations from 269 different brokers and 4,340 analysts from 1985 to 1995. Among the 360,000 recommendations in the database, 54.0% were buy recommendations and 39.5% were hold recommendations. The remaining 6.3% were sell recommendations, excluding those with coverage termination.

In contrast to previous research, Barber et al. (2001) built calendar-time portfolios according to consensus and classified them into five categories. The first portfolio contains the most favorable stocks, for which $1 \leq A_{i,t-1} \leq 1.5$, where $A_{i,t-1}$ indicates the average rating for firm i on date t-1. The second portfolio consists of the less favorable companies for which $1.5 \leq A_{i,t-1} \leq 2$; the third includes stocks for which $2 \leq A_{i,t-1} \leq 2.5$; the fourth group is consist of companies for which $2.5 \leq A_{i,t-1} \leq 3$; and the last portfolio includes the most unfavorable rating, for which $A_{i,t-1} \geq 3$. Every portfolio's value-weighted return is calculated at the end of each day. Value-weighted return is preferred over an equal-weighted return for two reasons. Firstly, equal-weighted returns and rebalancing on a daily basis lead to overstated portfolio returns. Second, as the individual returns of larger and more important firms contain a greater proportion of the aggregate return, value-weighted returns are more useful for illustrating the results from an economic perspective.

The authors calculated monthly return by compounding the daily value-weighted returns. Next, they subtract the portfolio return from the value-weighted market index return to calculate monthly market-adjusted returns. In order to calculate monthly adjusted returns, first day returns from analyst recommendations are excluded because the portfolio will be rebalanced at the end of every trading day. This approach accounts for the fact that investors cannot trade any stocks before any research reports are released officially.

Barber et al. (2001) found that investing the securities with the highest consensus recommendations earned an average abnormal return of 18.8%, whereas investing the securities with the lowest consensus recommendations earned only 5.78% abnormal return. Moreover, the result is more significant when controlling for Fama-French four factors. An abnormal return averaged over the portfolios of highly recommended stocks is 4.13 percent, while the abnormal return averaged over the portfolios with the least favorable recommendations is -4.91 percent. Similarly to Womack's findings, Barber et al. (2001) found the results were more significant for small-sized businesses. Accordingly, brokerage analysts' recommendations have information content.

Furthermore, Barber, et al. (2001) determined that abnormal returns are strongly affected by time. More specifically, investors who react after 14 days only experience half the excess returns compared to those investors who react daily. In addition, Barber et al. (2001) point out that frequent rebalancing is strongly associated with abnormal returns. The result indicated that under the assumption that buy and sell portfolios are rebalanced every day, the average abnormal return would be more than 400% per year (excluding transaction costs). By contrast, less frequent rebalancing (one week, two weeks) will result in lower abnormal returns.

In a follow up study, Barber, Lehavy, McNichols & Trueman (2003) tested whether abnormal returns still existed during the period from 1996 to 2001 using First Call instead of Zacks data. Their sample collected 228,000 recommendations from 353 securities firms including 9941 companies based on Thomson Financial database First Call. Overall, the sample contained 62.1% of buy, 34.3% of hold, and 3.6% of sell recommendations.

Using the same method as Barber et al. (2001), the authors categorized firms based on their average ratings, and then placed them in five portfolios according to calendar year. Surprisingly, stocks that were more highly recommended during the 1996-1999 period earned greater market-adjusted returns than those that were least recommended, while the stocks that were least favorable earned the highest returns during the period 2000-2001. Specifically, the average excess return of the most favorable stocks was -0.502%, while the average market-adjusted return of the least favorable stocks was more than 1.184%. One of the reasons for this reversal might be analysts' hesitance to shift away from small-growth stocks to small-value stocks (Barber et al., 2001). To be specific, recommended small-growth stocks generated significant abnormal returns between 1996 and 1999 because the Russell 2000 Growth Index increased more than twice while the Russell 2000 Value Index only increased more than half. However, the abnormal return turns to be negative during 2000-2001 because the Growth Index lost almost half but the value index only decreased by 18%. As a result, the worthiness of analyst recommendations for stocks is questioned based on this paper. There is still considerable uncertainty about whether brokerage analysts' recommendations will be useful over time.

Essentially, the study is in line with the previous studies that the market reacts strongly to brokerage analysts' advice, however, the value of the recommendation diminishes

rapidly after a few weeks for buy and strong buy recommendations and slightly longer for sell recommendations. Generally, transaction costs should also be included when investors trade based on the recommendation. However, there is still uncertainty about whether analyst-recommended portfolio strategies can reach abnormal returns once transaction costs are considered.

Barber et al. (2001) illustrated that purchasing the most highly rated stocks and short selling the least rated stocks can earn significant abnormal returns, making this the first paper to investigate consensus recommendations. Jegadeesh, Kim., Krische & Lee (2004) extended Barber et al.'s research by measuring the predictability of consensus recommendation levels and changes. Moreover, they investigated whether abnormal returns are related to analysts' preferences for characteristics of stocks.

Jegadeesh et al. (2004) obtained data from the Zacks Investment Research recommendations database from 1985 to 1998. There are 12 characteristic variables used for expressing recommendation level and changes in recommendations classified into five groups: Firm Size, momentum, growth, basic indicators, and trading volume.

In terms of momentum and volume, Jegadeesh et al (2004) expected that historical winners and low-volume stocks would earn the best recommendations. In addition to valuation multiples, they predicted that firms with high EP (earnings-to-price) and BP (book-to-price) ratios would receive more positive ratings. Regarding the growth indicators, Jegadeesh et al. (2004) anticipated that firms with low SGI (year-over-year sales growth) and low LTG (average analyst forecast of long-term earnings growth) should be given higher ratings. With respect to the fundamental indicators, the authors forecasted that firms with low TA (assets / accruals) and CAPEX (capital expenditures divided by total assets) will receive higher recommendations. Jegadeesh et al (2004)

did not provide any expectations about the size variable because the historical research did not have a consensus of opinions, although most of the research indicated that the returns generated by small businesses were higher than those generated by large companies.

Consensus recommendations referred to a firm's cumulative outstanding recommendations over the past 12 months. If analysts gave multiple recommendations in one year, authors would choose the most recent one. A consensus recommendation change is determined by the difference between the current quarter's recommendation level and the previous quarter's recommendation level.

The sample distribution showed that there was an average of 971 firm observations across 56 quarters. Approximately 56% of the observations are Nasdaq firms, while the remaining are NYSE/AMEX firms. Jegadeesh et al (2004) divided the consensus recommendation levels and changes into five groups: 0 (least favorable rating), 0.25, 0.5, 0.75, and 1 (most favorable rating). Based on the descriptive analysis, only about 5% of the recommendations were "sell" or "strong sell", while more than 60% were "buy" or "strong buy". It is in line with the previous literature that analysts are unwilling to issue sell recommendations. Moreover, Jagadeesh et al. (2004) found that about 32% of companies that received prior consensus recommendations now appear in the bottom quintile. In contrast, about 29% of the companies with the lowest prior consensus rate appear in the highest recommendation change quintile. That is, analysts tend to upgrade (downgrade) firms with low (high) prior recommendations.

Jegadeesh et al. (2004) report a significant Spearman rank correlation between future abnormal returns and recommendation level and changes. It suggests that brokerage analysts' recommendations can successfully predict future stock market movements.

After that, the authors test whether Spearman rank correlation is significant between future market-adjusted abnormal return and twelve explanatory variables. The results show that historical winners and TA (total accrual ratio) are significantly positively correlated with the future market-adjusted return. Historical winners and TA are the explanatory variables for momentum, implying that analysts offer the most favorable advice for securities that have momentum. Similarly, the authors find a significant positive correlation between future market-adjusted abnormal return and firms with high turnover, low PB, high EP, high accruals, and high capital expenditure ratios. The result is consistent with what the authors expected. Furthermore, the authors regressed analyst recommendation on 12 explanatory variables. The regression results indicated that momentum is the most significant factor. That is, analysts prefer to give the most favorable recommendation to momentum stocks.

In summary, Jegadeesh et al. (2004) suggest that brokerage analysts' recommendations and 12 firm characteristics variables can successfully predict future abnormal returns, and among the 12 firm characteristics, the momentum factor is the most significant. It indicates that financial analysts prefer to give the most favorable recommendation to the stocks that are historical winners.

Most of the research conducted before 2010 illustrated that brokerage analysts' recommendations had investment value except for Barber et (2001) who found that the least favorable stocks earned the highest returns during the period 2000-2001. Barber, Lehavy & Trueman (2007) evaluated the performance of recommendations made by investment banks and independent research firms. They used the First Call database, a collection of almost 335,000 recommendations regarding more than 11,000 companies by 409 brokers between February 1996 and June 2003. These recommendations were divided into two classes: investment bank recommendations and independent research

recommendations (firms without investment banking services). Both groups were further divided into buy (buy, strong buy and change to buy), hold and sell recommendations (sell, strong sell and change to sell). Barber et al. (2007) computed abnormal returns on daily basis for both buy and hold/sell recommendation portfolios by controlling for the Fama-French four factors model. The empirical findings showed that buy recommendations from independent researchers have an average of 3.1 points (8% annually) abnormal return above the investment banks' buy recommendations. Conversely, the hold/sell recommendations from the investment banks have an average of 1.8 point (4.5% annually) return above the independent research firms' hold/sell recommendations. It suggests that independent research firms' buy recommendations are more valuable than those of investment banks, whereas investment banks' hold/sell recommendations are more valuable.

Barber et al. (2007) identified two possible reasons for the lower value of recommendations from investment banks. To begin with, a research firm that is independent has a greater ability to identify undervalued companies than does an investment bank. Moreover, independent research firms issue "buy" ratings based on higher threshold expected returns than investment banks. However, neither of these statements are true. Barber et al. (2007) found that buy recommendations from investment banks had an abnormal daily return of 0.4 basis points (statistically insignificant) higher than independent research firms during bull markets. In contrast, buy recommendations from investment banks had an abnormal daily return of 6.9 basis points (statistically significant) lower than independent research firms during bear markets. These empirical results indicate that analysts' unwillingness to downgrade stocks during the bear market accounts for a significant portion of investment banks' underperformance.

Furthermore, Barber et al. (2007) investigated whether sanctioned banks' advice performed differently from those of non-sanctioned banks following the SEC's sanction of 10 investment banks. They divided the sample into three categories: sanctioned investment banks (the 10 sanctioned banks), non-sanctioned investment banks (lead or joint-lead underwriters like the sanctioned banks) and non-sanctioned banks (never a lead underwriter, called syndicate members). Interestingly, all three types of investment banking underperform independent firms by an average of 2.2 basis points (non-sanctioned banks) to 3.5 basis points (sanctioned banks). Accordingly, it may not be justified to differentiate between sanctioned and non-sanctioned banks in terms of distributing independent research to clients. However, non-sanctioned banks' (syndicate members) buy recommendations generate significantly higher returns than those issued from sanctioned banks and non-sanctioned banks ((lead or joint-lead underwriters), particularly during a bear market. Specifically, the syndicate's buy recommendations produce a further abnormal return of 2.7 basis points for sanctioned banks and 2.5 basis points for lead underwriters.

Brokerage analysts provided not only buy and sell recommendations, but also the target price, which became more common after 1997. Most of the firms have target prices, based on their market value. This raises the question of whether target prices provide additional information beyond recommendations. A study by Brav and Lehavi (2003) focuses on this topic. Bravi & Lehavi (2003) analyzed a large dataset from First Call, which contained 223,016 price targets for 6544 firms by 190 brokers from 1997 to 1999. They established two measures to determine the information content of analysts' price targets. The first measure represents analysts' estimates of the firm's expected annual return, denoted TP/P, measured as the difference between target price and stock price two days before the announcement. This second measure was used to test how investors

reacted to a new target price relative to a prior target price. Denoted △TP/P, measured as the difference between the difference between new and old target price and the stock price two days before the announcement.

Bravi & Lehavi (2003) found that the market is strongly influenced by the price targets. Specifically, A price reaction of about 2.1% for stocks that experienced the biggest change in target price. The market reaction is negative for those whose target price was revised down but the magnitude is close to 0. Moreover, Bravy & Lehavy (2003) found that the price of the upgraded recommendation rose by roughly 3% over the following six months. More importantly, they demonstrated that price drifts were almost doubled when stocks were both in the category of "upgraded recommendation" and "most favorable price revision". In this case, a price target provides information beyond what is offered in recommendations.

Most of the research suggests that sell-side analysts make a significant contribution to price discovery, except for Barber et al. (2001) who found that analysts' recommendations were worthless during 2000-2001 but this study was not further explored.

Altınkılıç & Hansen (2009) was one of the first studies to formally challenge the value of brokerage analysts' recommendations. Altınkılıç & Hansen (2009) collected different data from multiple databases during 1997-2003. Specifically, they collected revision announcement dates from First Call, daily stock prices from the CRSP and intraday stock prices from the TAQ. I/B/E/S and Securities Data Company (SDC) provided a specific date for firm events (e.g. earning announcement, merger). Different from previous research, Altınkılıç & Hansen (2009) examined the daytime revision rather than the night time revisions since they believed the night time revisions include both

the reaction to revisions and firm events occurring simultaneously.

Altınkılıç & Hansen (2009) plotted a graph that shows the revisions with firm events (earnings, earnings guidance, merger or financing). The graph showed that almost 80% of the revisions are issued following firm events, and approximately 30% of the revisions are announced on the same day as the firm events. Moreover, they found that mean pre-return (return before revision) for one downgrade (upgrade) is -1.35% (+0.65%). It suggests that brokerage analysts are inclined to piggyback the revisions based on the firm events. In other words, a large portion of the daily abnormal returns associated with analyst revisions shown in earlier studies is due to economic implications revealed by firm-related events rather than analyst revisions.

Altınkılıç & Hansen (2009) investigated whether intraday return differs significantly from zero before and after revision for time intervals of one hour and two hours. The results indicate that there is a significant return for both intraday windows when the firm event overlaps with the announcement date. Alternatively, when the firm events do not overlap with the announcement date, the revision announcement return is not significant for both intraday windows. Therefore, it suggests that brokerage analysts' advice is worthless as investments.

In summary, Altınkılıç & Hansen (2009) indicated that analyst recommendation revision has no investment value. Specifically, revisions of downgrades are likely to follow adverse events with the firm, while revisions of upgrades are likely to follow positive events with the firm.

3.5 2010-2020

Prior to 2010, most studies concluded that brokerage analyst recommendations had investment value. However, not every recommendation is valuable. In this case, determining which types of recommendations are valuable becomes the big question. Loh & Stulz (2011) was one of the first studies to address this question. Loh & Stulz (2011) investigated whether any changes in analyst recommendations were associated with a significant average abnormal return.

Loh & Stulz (2011) collected samples from I/B/E/S, including 196,854 recommendation changes over the period 1993-2006. The recommendation ratings were divided into five groups, 1(sell), 2(underperform), 3(hold), 4(buy) and 5 (strong buy). There are a significant number of recommendations for one-point upgrades and one-point downgrades in the sample. Specifically, there are 47,006 recommendations in the +1 group (23.9% of the sample) and 57,290 recommendations in the –1 group (29.1%). With respect to abnormal return, a one-point upgrade group yields a CARS of 2.687%, and a two-point upgrade group yields a CARS of 2.783%. There is a much bigger difference between the medians, at 1.530% and 1.694%. As a result, CARs with high mean values are skewed by outliers, suggesting that only a small number of recommendations are effective.

Loh & Stulz (2011) speculated that the large difference between medians and averages was due to outlier recommendations and recommendations issued in conjunction with firm news. In other words, firm news events (such as earnings releases) have had a significant impact on stock market rather than the recommendation itself. According to Loh & Stulz (2011), removing observations related to firm events in a three-day window reduced the CAR of -1 groups by more than half, from -3.786% to -1.623%.

Additionally, the median CAR falls from -1.8% to -1.07%. Similarly, the average (median) CAR for +1 groups drops from 2.687% (1.53%) to 2.069% (1.2%). In light of these findings, it appears that firm news releases account for much of the average recommendation CAR rather than the recommendation itself. Loh & Stulz (2011) further eliminated outlier recommendations by excluding LTS-identified outliers (least trimmed squares), finding that the average CAR dropped to -1.2% and the median CAR to -0.98%. It is suggested that outlier recommendations have a considerable effect on the CAR. Altogether, it can be concluded that many recommendations do not add value to the stock price.

Loh & Stulz (2011) further compare influential revisions to non-influential revisions. An influential revision is defined as one that has a market reaction greater than 1.96 times the standard deviation of the firm's previous three-month return or previous year return. Using the first definition, 10.0% of recommendation changes were influential, while only 3% were influential according to the second. An interesting fact is that about one quarter of analysts do not make an influential revision at any point during their lifetime. More than half of analysts do not make an influential revision when using the second definition. The authors then examined five variables to identify analyst-related characteristics: forecast accuracy, direction of a recommendation relative to the consensus, star analyst, analyst experience, and concurrent earnings forecast. The empirical results indicated that influential revisions are associated with higher forecast accuracy, and a higher possibility to move away from herd effect (58.2%). Moreover, influential recommendation changes tend to be announced by star analysts and analysts with more experience. Additionally, Loh & Stulz (2011) identified eight firm-related variables to find the relationship between influential change and firm characteristics, including BM ratio, market capitalization, ownership structure, dispersion, systemic

volatility, total volatility, trading volume, and expected earnings per share. The results illustrated that influential recommendation changes are generally made on smaller companies with lower total and system volatility, fewer turnovers, and fewer prior earnings forecasts and higher institutional ownership.

Finally, Loh & Stulz (2011) focused on whether influential recommendation changes can be predicted. Probit regression was used to determine how firm-related and analyst-related variables influence the likelihood of a recommendation being influential. According to the results, star analysts, analysts with contemporaneous earnings forecasts, and analysts with high levels of confidence are more likely to produce influential analyst revisions. Regarding the firm-related variables, growing firms, firms with high institutional ownership, firms with lower volatility, companies with high turnover, firms with low earnings forecasts, and small firms tend to receive influential revisions.

In summary, Loh & Stulz (2011) examined how revisions are sometimes related to very large abnormal returns. Stock prices often react quite differently to such changes than to typical recommendations. The change in analyst recommendations may cause investors to reassess the way a company is viewed. After removing changes associated with confounding information, only one tenth of the recommendation revisions are influential.

Bradley, Clarke, Lee & Ornthanalai (2014) intended to counter and extend the Altınkılıç and Hansen (2009) study by investigating whether brokerage analysts' recommendations had value. Bradley, et al. (2014) used the same database as Altınkılıç and Hansen did, but with a different time period from 2002-2007. Revised announcement dates were obtained from First Call, stock prices were obtained from the

CRSP, intraday stock prices were obtained from the TAQ. SDC and I/B/E/S provided specific dates for firm events.

Bradley, et al. (2014) firstly repeated the same experiment Altınkılıç and Hansen conducted in 2009 and found the same result. According to Bradley, et al. (2014), the average announcement-period return for the full sample of upgrades is 1.41%. Furthermore, almost three-quarters of upgrades are profitable. With respect to the overnight recommendation, the abnormal return is 1.83%, and it turns to 1.72% after excluding confounding events. However, when it comes to daytime recommendations, there is a much smaller 30-minute return for upgrades, at 0.22%. Similar results were found in downgrade groups. The average announcement-period return for the full sample of downgrades is -1.49%. Almost 70% of downgrades are unprofitable. The 30-minute return for day-time downgrades is -0.25%. The results are consistent with Altınkılıç & Hansen (2009), who found that 30-minute returns for daytime recommendation revisions centred on the reported time stamp are not economically significant. It suggests that there was no investment value in brokerage analysts' recommendations as nighttime revision included the reaction to both the revisions and firm events that were published at night, but daytime revision did not.

Nevertheless, Altınkılıç and Hansen (2009) executed their analysis on the assumption that I/B/E/S provided an accurate time stamp. However, if a considerable percentage of event dates are not correct, then analysis based on these reported announcement dates might result in the wrong results. For the purpose of examining the accuracy of the reported announcement date, Bradley, et al. (2014) compared I/B/E/S and First Call's recorded announcement date with those hand-collected from newswire searches. Interestingly, all three types of announcements (recommendation announcement date, management guidance announcement date, and earning release) have substantial delays

in their reported daytime time stamps. According to the empirical results, there is an average delay of 2.4 hours, while the median delay is 1.3 hours. In addition, upgrades are delayed more than downgrades. Then, any delayed time stamps from I/B/E/S and First Call were replaced with newswire time stamps and repeated the same analysis. However, the outcome is different. The 30-minute market return for upgrades is 1.83% and the 30-minute market return for downgrades is –2.10%. This indicates that brokerage analysts' recommendations can be informative. Also, these findings suggest that a time stamp delay may lead to false inferences, which might account for the findings of Altinkilic & Hansen (2009).

According to Loh & Stulz (2011), only 12% of the recommendations were informative and the average return may overstate the impact of analysts. Bradley, et al. (2014) then investigated whether individual analyst recommendations could account for significant market reactions by using a nonparametric jump detection test. The jump detection test is premised on the idea that smooth changes in price result from regular transactions, whereas sudden changes in price are generated by unexpected information. The results indicate that one tenth of management guidance announcements, 16% of earnings announcements, and one-quarter of analyst recommendations are related to jumps after removing jumps caused by overlapping events. Moreover, unconditional jumps occur consistently within 0.4% of all 15-minute intervals. As a result, jumps are uncommon, and they frequently occur at the same time when recommendations are released implies that individual recommendations are informative. Furthermore, at the 15-minute (30-minute) horizon, 25% (20.8%) of recommendations, 16.3% (13.3%) of earning release, and 10.5% (9.5%) of guidance announcements are linked to jumps. It suggests that earnings announcements and management guidance have a smaller impact on the market than analyst recommendations. A logistic regression study shows that there is a

19-fold increase in the likelihood of observing a jump when an analyst issued an upgrade revision.

To sum up, Bradley, et al. (2014) have contributed significantly to theoretical and empirical research on sell-side analysis. In their first contribution, the authors demonstrated that delayed time stamps from the database may affect the validity of the recommendations in Altinkilic and Hansen (2009). Furthermore, two of the most commonly used databases, First Call and I/B/E/S, generally have delayed time stamps during the daytime. In contrast, newswires provide more accurate time stamps than First Call and I/B/E/S. In the end, the researchers compared the effects of three types of firm events (revision, management guidance, and earnings release). According to the results, analysts' recommendations had a greater impact during the sample period than earnings announcements and management guidance.

A study by Li, Ramesh, Shen & Wu (2015) aimed to illustrate the relationship between recommendation changes and firm-related events. Also, this paper used a different approach to evaluate Altinkilic and Hansen's findings in 2009. Li et al. (2015) analyzed firm-related news between 2003 and 2010 using an extensive database from Thomson Reuters. In the sample, there are approximately 55,000 recommendations for downgrades and 48,000 for upgrades. Three groups of samples were analyzed: recommendations released during normal trading hours, recommendations released during extended trading hours, and recommendations released outside of trading hours. It is worth noting that the number of recommendations released during normal trading hours has decreased over time. Specifically, 42% of downgrades (40% of upgrades) were published during regular trading hours in 2003, whereas 29% of downgrades (30% of upgrades) were published during extended trading hours, and 31% of downgrades (31.0% of upgrades) were published during non-trading hours. In 2010, only 22.8%

(20%) of downgrades (upgrades) were released during regular trading hours. More than 60% of the recommendations are released during extended trading hours (52% downgrades and 52.2% upgrades), and 25.7% of downgrades (27.9% of upgrades) were published during non-trading hours. This suggests that the proportion of recommendations released after trading hours has been increasing over time, which is why research cannot simply focus on the regular trading hours recommendations. As for pre-events (corporate news preceding recommendation revisions), 61.1% of recommendations were revised prior to corporate news during the three-day period. Of these, 45.6% move in the same direction as the price movements. It appears that 27.9% (61.1%*45.6%) of all recommendation revisions are "piggybacked".

To further confirm whether these recommendations are "piggybacking" or not, Li et al. (2015) calculated the cumulative abnormal returns for each 30-minute interval over the course of a three-day period starting with the announcement date of the latest firm event. For regular trading hour groups, the results showed significant price discovery starts 330 minutes before the recommendation revision and ends 90 minutes after the recommendation revision. A peak of 6.1% incremental price discovery is seen in the 30-minute interval prior to the revision. By contrast, the pre-event itself results in an additional market reaction of 9.4% within 30 minutes of the news release. In addition, there are many price discoveries following after-hours recommendations. In conclusion, even confirmation revisions play a crucial role in the market's price discovery based on pre-events and are not just piggybacking.

Li et al. (2015) then analyzed intraday market performance to the recommendation changes made during normal trading hours, extended hours, and non-trading hours. In line with Altinkilic and Hansen's findings in 2009, when downward revisions are issued during normal trading hours, the mean market reaction is -4.06% over the entire 3-day

window, with most reactions occurring in the pre-announcement window (-2.67%). While for the upgraded revisions, the average announcement return during the 3-day window is 3.1% with most reactions occurring in the pre-event window (1.69%). However, the result for the extended trading hours groups is different. For the downgrades, the average announcement return during the 3-day window is -4.42 with most reactions occurring in the post-announcement window (-2.59%). Upgrades had an average return of 3.81%, with 2.37% occurring during the post-announcement period. The empirical results for the revisions during non-trading hours are similar to extended trading hours. Obviously, this result goes against piggybacking theory that indicates pre-event reactions to be greater than post-event reactions. Moreover, Li et al (2015) also analyzed recommendations revisions in terms of the intraday trading volume. The results are similar. A high pre-announcement volume reaction for revisions was observed in the (-1 day, -21 minutes) window during regular trading hours. In contrast, reactions to revisions published after trading hours are largely seen in the post-event window (+21 minutes, 1 day). Price and volume movements are concentrated in the post-event period for revisions published after trading hours. This indicates that they are not piggybacking.

There are two main concerns for the above research. First, It is possible for the market to take a long time to react to pre-events when analyzing after-market revisions. In this case, the price changes following the announcement of recommendation changes could be a delayed reaction to the previous firm news. Additionally, it is possible that the post-event returns are contributed to the firm-related news published after the revision was released. To address these concerns, the researchers examined first revisions that did not follow any firm-related news in the 6-day window. The result indicated that pre-event returns were lower than those found in previous research, indicating some of the

returns may be contributed to the pre-event. In contrast, post-announcement returns are almost the same as before. Moreover, for extended-trading hours and non-trading hours revisions, the majority of price reactions occur after the revisions are released. This indicates that the price reactions in the 3-day window originated from recommendation revisions rather than confounding events. Additionally, both trending and contrarian recommendations generated significant post-announcement returns. Obviously, this is unlikely due to corporate events. That is, analysts help facilitate price discovery by issuing trending revisions in response to corporate news, and they also help reverse prevailing sentiments by issuing opposing recommendation changes after corporate news is released.

Finally, Li et al. (2015) found that the market reacts more strongly to after-hours revisions than to regular hour revisions. Some brokerage houses may release more informative revisions after hours in order to gain an advantage over their larger clients, especially professional investors and institutions that dominate the after-hours market. It is also possible that brokers will need time to contact and encourage their clients to trade based on the recommendations prior to the markets opening. As a result of the study, the information characteristics of after-hours revisions are different from those of regular-hour revisions. Focusing solely on regular hour revisions will result in biased and incomplete results about the information provided by revisions.

In sum, this paper presents two main contributions. First, Li et al. (2015) demonstrated that the estimate of the confounding events by Altinkilic & Hansen (2009) may be inaccurate. Furthermore, relying solely on confounding events without taking into consideration their market influence could result in inaccurate conclusions about the piggyback practice. Second, examining only regular hour revisions may lead to biased and incomplete conclusions about the informativeness of recommendation revisions as

after-hours recommendations gain in percentage year after year.

Boulland, Ornthanalai & Womack (2017) examined whether changes in recommendation speed have an impact on investment returns. It is one of the first studies to examine how analysts' decision styles affect the stock market. Boulland et al. (2017) obtained brokerage analysts' recommendations from I/B/E/S between January 1993 and December 2012. Afterwards, the samples were divided into three groups according to recommendation turnover: slower, average, and faster. They proposed a new method to assess how quickly analysts update their recommendations compared with their peers. To begin with, Boulland et al. first ranked the speed (or slowness) with which analysts revise their recommendations in comparison with others covering the same company, starting from the slowest to the fastest. Following this, they examined the percentage of analysts' covered securities that belong to the slowest (or fastest) quartile. They then used the binomial test to infer each analyst's recommendation speed–style. Under the null hypothesis that the analyst did not change recommendations more quickly or more slowly than peers, a quarter of the stocks he/she covers would be in the fastest (slowest) quartile. Alternatively, a rejection of this null hypothesis would indicate that the analyst makes frequent (or insufficient) revisions to recommendation decisions.

According to their findings, an analyst follows on average 6.91 stocks and makes no changes to a recommendation for an average of 12.36 months. A fast-turnover analyst typically revised their recommendations every six months, in contrast, a slow-turnover analyst typically updated recommendations every 20 months. Intriguingly, an analyst recommendation's speed style remains relatively constant over time. In other words, faster-turnover analysts remain to change their opinions faster, and slower-turnover analysts remain to change their opinions slower than their peers. An analyst who is

classified in the fast turnover group in the current year has a 67% chance of moving into the fast turnover group the following year, while he has a 1% chance of moving into the slow turnover group. As a result, analysts' tendency to revise their recommendations appears to be constant.

In addition, Boulland et al. (2017) found that recommendation changes by slow-turnover analysts performed significantly better than those by fast-turnover analysts. Specifically, the abnormal returns for upgrades are 2.06% higher and –1.40% lower for downgrades for slow–turnover analysts compared with fast–turnover analysts in the first four months after opinion changes. The authors further proved this by developing calendar portfolios similar to Barber et al. (2001) and indicated that the slow analysts' portfolio outperformed about 100 basis points more than the fast analysts' portfolio.

Previous literature discussed the influence of analyst recommendations and recommendations revisions on the return of a stock. However, evidence regarding whether analysts are competent is scarce. The average amount of information contained in recommendations does not imply that the average analyst is skilled. This became increasingly important after 2018 when MiFID II in Europe forced a direct payment structure for research. Crane & Crotty (2020) recently published a paper investigating the differences between skilled analysts and unskilled analysts. Crane & Crotty (2020) collected analysts' recommendations from I/B/E/S over the period 1993 to 2015. A total of 356,077 recommendations were revised by 5,478 analysts over the sample period. In order to transfer revisions to a skill measurement, the authors calculated the abnormal return by investing in upgraded stocks and selling downgraded stocks. According to the summary statistics, the distribution of average abnormal returns appears to be skewed and exhibits excess kurtosis, which suggests that the distribution is not normalized. Furthermore, most average abnormal returns are economically positive, whereas only

42% (53%) of analysts' abnormal returns are statistically significant at a 5% (10%) level.

Crane & Crotty (2020) then estimated a constrained two-component mixture model with a constraint of no abnormal performance for analysts in the lower skill component (that is, $\mu_0 = 0$ and $\sigma_0 = 0$). As a result, only 5.6% of the analysts fall into the low-type distribution (centred at $\mu_0 = 0$). The remaining 94.4% reflects a distribution clustered at a 1.58% abnormal return. The total unskilled analysts are accounted for by the analysts from the low distribution and the analysts from the second distribution with negative true ability, which is 10.6%. This indicates that most analysts are skilled (89.4%).

However, the two-component constrained model is limited in its ability to explain the heterogeneity of analysts' skills. Specifically, some analysts' skills are higher than others. In this case, Crane & Crotty (2020) estimated unconstrained mixture models using distributions with 1, 2, 3, and 4 components and chose the most suitable one by using the adjusted BIC and bootstrapped likelihood ratio tests. Based on the final model, estimated skills of analysts are 1.5% on average, and 1.27% on median. Furthermore, almost 97% of analysts generate positive abnormal returns, which indicates that they are economically skilled. However, only half of the analysts' abnormal returns are statistically significant. Thus, if researchers use traditional hypothesis testing to identify the number of skilled analysts, many analysts would be properly classified as unskilled when using the mixture model.

The next issue Crane & Crotty (2020) addressed was whether analysts can create and process information. In the analysis, revisions made within three days of firm-related events were classified as information processing revisions, whereas others were classified as production revisions. Next, they analyzed an analyst's ability to process information by computing average abnormal return across revisions based on firm-

related events, and their ability to produce information by computing average abnormal return across revisions without news. The mixture model of information processing revision indicates that analysts are proficient at piggybacking on firm-related events and that their real ability is only around 2%. Regarding information production, it is shown that more than 90% of analysts who issue revisions following non-news days can produce new information, with the true ability of these analysts estimated at 1.7%. Those findings are consistent with Bradley et al. (2014) and Li et al. (2015), who find that analysts contain incremental information.

In spite of the fact that nearly all analysts possess skills, there are significant cross-sectional factors affecting their skills. Crane & Crotty (2020) then evaluated the characteristics of skilled analysts. It is impossible to measure true ability. In this case, they allowed the probabilities of selecting an analyst from each component of the mixture to be affected by the characteristics of the analyst, including the total number of recommendations, the percentage of sell recommendations, industry coverage, and the tenure of the analyst. Results indicate that experienced analysts tend to fall into the high-type distribution, comparatively, those making a greater number of recommendations per year tend to fall into the low-type distribution. Moreover, analysts who cover a broad range of industries tend to be classified as highly skilled, which contradicts the idea that specialized analysts are more productive. Furthermore, analysts giving a large percentage of sell recommendations tend to be recognized as high-skilled analysts, which is consistent with Barber et al. (2006).

The results above demonstrate that analysts contribute significantly to the price discovery. Crane & Crotty (2020) next estimated the information's economic value by calculating actual USD. In the event that the most high-type analysts recommend small stocks heavily, their contribution to price discovery in dollars are small, regardless of

whether the returns related to the recommendations. Authors found that the size of the companies' analysts makes recommendations has a negative correlation with their expected abnormal returns. In order to convert expected skills into dollars, they used market capitalization and institutional ownership to evaluate the corresponding stock. Based on market capitalization price discovery, the median analysts' revisions are worth $22 million and to institutional investors they are worth $15 million. It represents the total value that the revision contributed to the market, but the firm cannot be traded at that price. As a consequence, the authors also value every pick according to the average changes in institutional positions. In this case, a given institution is valued at approximately $40,000 based on a median analyst pick.

There is a concern with the finding that most analysts are skilled. It might be due to the fact that analysts continuously make valuable recommendations, or it may be due to the fact that analysts make very few highly profitable recommendations. This concern was addressed by estimating a mixture model based on the underlying recommendation level. Influential recommendations were defined as those with a t greater than 1.96. According to the mixture model, 86% of recommendations are informative, while only 10% are influential. This is in accordance with the findings of Loh & Stulz (2011), who determined that only 12% of recommendation changes have a significant effect on the market. As a result, non-influential recommendations tend to have economically significant abnormal returns even though they are statistically noisy.

Based on the recommendation-level mixture model, 86% of revisions are economically significant. According to the authors, influential revisions have a median abnormal return of 6%. While the median abnormal return for non-influential revisions is 1%. The ability of the cross-section of analysts would be underestimated if researchers ignored these economically influential recommendations. Comparing influential and

non-influential recommendations among terciles of expected skill, it is worth noting that the top tercile analysts have higher abnormal returns not only because they make more influencer recommendations, but also because of the higher abnormal return of their non-influential recommendations and influential recommendations. The average real abnormal return increases from 14% (-0.53%) to 21% (1.44%) across terciles when revisions are influential (non-influential).

Crane & Crotty (2020) analyzed performance in terms of brokerage level. As a result of superior training, or better information access, top analysts may concentrate in a few brokerages. In addition, research firms may be faced with varying incentives depending on their other business lines, which could affect performance. The cross-section of brokerages revealed a mean cross-sectional skill distribution of 1.3%, and 89% of brokerages are considered skilled, which is a bit smaller than analyst-level estimates (90%). It appears that brokers are skilled in large numbers, but their proportion is smaller than that of analysts, indicating a degree of concentration of talent. Following the SEC's Global Research Analyst Settlement, a higher percentage of brokerage firms are drawn from the high-type distribution (from 56% to 64%).

In summary, Crone & Crotty (2020) contributed to a stronger understanding of analyst skills. The results suggest that almost all analysts are skilled, but most of them are economically significant not statistically significant. An analyst's typical recommendation to a client institution is worth about $50,000. Moreover, most of the recommendations made by top analysts are more influential and informative than those made by other analysts.

4.0 Method

This part illustrates detailed information regarding the database used, the method used for filtering and processing the data, the sample period covered, and the empirical research design.

4.1 Data Selection

In this study, analyst recommendations were sourced from CHOICE. This database was established by East Money which is one of the largest brokers in China. CHOICE specializes in providing high-quality financial data and associated services to financial institutions, academic research organizations, and professional investors. In this research, CHOICE will provide the stock ticker, the corresponding industry, the date of the recommendation issued, the brokers, analysts, rating, stock price and market return.

The period covered by this research spans 2012 to 2020, with a specific focus on the companies covered in the Financial Times and Stock Exchange (FTSE) China A50 Index. FTSE China A50 index is a highly representative index for the big firms in the Chinese stock market because it includes the 50 biggest and most important Chinese listed companies. Specifically, FTSE China A50 includes companies with a total market capitalization of approximately 33% of the total Chinese market capitalization according to CHOICE. Table I in the appendix lists the name of firms that are included in the FTSE China A50 index.

4.2 Sample selected

The brokerage analysts' recommendations must meet the following requirement to be considered for the sample:

- Minimum of one analyst who has issued an opinion and revised it within one year. A recommendation that exceeds one year is considered as a new recommendation to prevent recommendations without reference to predecessor recommendations.
- There are some recommendations issued by the research institute that will be excluded because the research institute is not a broker and does not provide any financial services.

For the event study and regression analysis, the following requirements were to be considered during the selection of the upgrade revision and downgrade revision:

- As one recommendation indicates no change in recommendation, analysts who issue only one recommendation are excluded.
- A revision to a previous recommendation made outside of the sample period is not considered. For instance, analysts issued a recommendation in 2011 and upgraded it in 2012. The revision in 2012 is not included since the recommendation issued in 2011 is not in our sample period (2012-2020).

The cross-sectional regression analysis will focus on the buy group and sell group. The buy group refers to rating upgrades from a strong sell, sell, and hold recommendation to a buy and strong buy recommendation. The sell group refers to rating downgrades

from a strong buy, buy and hold recommendation to a sell and strong sell recommendation.

Recommendations appearing for the first time in the sample period are referred to as initial recommendations, although they may not be a real initiation. Taking this assumption into consideration is important for the following analysis.

Every official daily closing price is determined after the adjustment of market events such as dividends payouts and stock splits. It is important to note that if the recommendation is issued after the close of the market, the date of issue for the recommendation in the CHOICE will be tomorrow not today. For example, if the recommendation is issued at 8 pm on Jan. 1st, the date on the CHOICE will be Jan 2nd. Therefore, for each security covered in the FTSE A50 China index, the return for the corresponding stock is calculated by taking the natural logarithm difference between its closing price and its previous closing price, here is the formula:

$$R(t) = Ln[P(t)] - Ln[P(t-1)]$$

There are several advantages to using natural logarithms returns instead of arithmetic returns. In the first place, assuming prices are log normally distributed implies that returns are normally distributed facilitating statistical inference analysis. Additionally, the arithmetic mean does not correctly reflect the real return of investment during compound investment while a natural logarithm can. For example, if an investment goes up 50% this year and down 50% next year, it has an arithmetic average return of 0; but in fact, after two years the investment has lost 25% of its initial capital. However,

logarithmic return correctly reflects the true return of the investment because of its additivity principle. The natural logarithm return for these two years is 40.5% and -69.3%, which adds up to -28.7%, further translating to the percentage, which is -25%.

The natural logarithms' additivity allows the use of two theorems: the central limit theorem and the law of large numbers. The overall logarithmic rate of return is calculated by adding up the logarithmic rates of return for each period based on its additivity principle. Assuming that the dissimilar periods are independent of each other, the sum of natural logarithm returns of T periods is equivalent to the sum of independent random variables of T. Based on the central limit theorem, the sum approximately follows the normal distribution (Rosenblatt, 1956). According to the law of large numbers, as time increases, the mean of the single-period logarithm return converges to its expectation (Judd, 1985).

More importantly, the process of the stock price is described as a stochastic process with independent increments, which is known as geometric Brownian motion. According to Ito's theorem and Brownian motion, the logarithm of stock price follows a normal distribution. If the logarithm of a random variable follows a normal distribution, the random variable itself also follows a log-normal distribution. Thus, when using geometric Brownian motion to describe the stock price, the obtained stock prices follow a lognormal distribution (Stein & Stein, 1991).

4.3 Rating system

With respect to the term of the recommendation, the terms of analysts' recommendations vary according to the standards of the brokerage firms. Commonly, analysts use terms such as "strong buy", "buy", "hold", "sell" and "strong sell". Nevertheless, brokerage analysts sometimes use different terms for the same rating, like 'underperform', 'outperform', and 'neutral'. For convenience to do the empirical research, different ratings must be standardized into the same rating system.

Generally, in the Chinese stock market, strong buy recommendations indicate stock prices will increase more than 15% compared to CSI 300 (Shanghai and Shenzhen index 300) over the next six months (China Securities Regulatory Commission, 2020). Buy recommendation means that analysts believe the stock price will increase between 5% and 15% compared to the CSI 300 in the next six months. Hold recommendations illustrate that the stock price will fluctuate between -5% and 5% related to CSI300 over the next six months (China Securities Regulatory Commission, 2020). Analysts recommend selling the stock if they believe its price will decline between 5% and 15% compared to the CSI 300 in the next six months (China Securities Regulatory Commission, 2020). An analyst who predicts a strong sell suggests that the stock price will decrease over 15% in the following six months when compared to the CSI300 (China Securities Regulatory Commission, 2020).

In this research, a common 5-point rating scale was used to evaluate recommendations made by different brokerage firms based on the rules mentioned above. Specifically,

each analyst's recommendations were rated from 1 to 5, where 1 represents a "strong sell", 2 represents a "sell", 3 represents a "hold", 4 represents a "buy", and 5 represents a "strong buy". A research report that only provides analysis and does not provide ratings will be excluded from this study.

4.4 Research Design

The quantitative analyses used in this thesis involve several steps, which will be explained as follows:

To begin, the original data will be downloaded from CHOICE, which includes the issued date, the stock ticker, the title of the research report, the name of the analysts, the name of the broker and the rating of the recommendation. Due to the fact that these data are Chinese, they will be translated into English first, then standardized into a common rating system and given the appropriate number from 1 to 5. The next step will be to analyze the descriptive statistics of all recommendations obtained from Choice, followed by the descriptive statistics of the recommendations in bull and bear markets.

The definition of bull and bear markets in this article differs from that in previous literature. In prior literature (e.g. Ferrer & Santamara (2011), it has been suggested that the VIX index determines the differences between bull and bear markets, but the index has not been calculated for the Chinese stock market since 2018. Figure 1 displays the historical movement of the Shanghai Stock Index (SSE). The SSE index increased from

1991.06 on 12th March 2014 to 5178.19 on 19th June 2015 and then declined to 2638.96 on 29th January 2016. In other words, the SSE index almost tripled within a year and then decreased by half within the next six months. Consequently, in this study, the bull market recommendation indicates that the recommendation was issued between 12th March 2014 and 19th June 2015. A bear market recommendation is defined as a recommendation that was issued between 19th June 2015 and 29th January 2016.

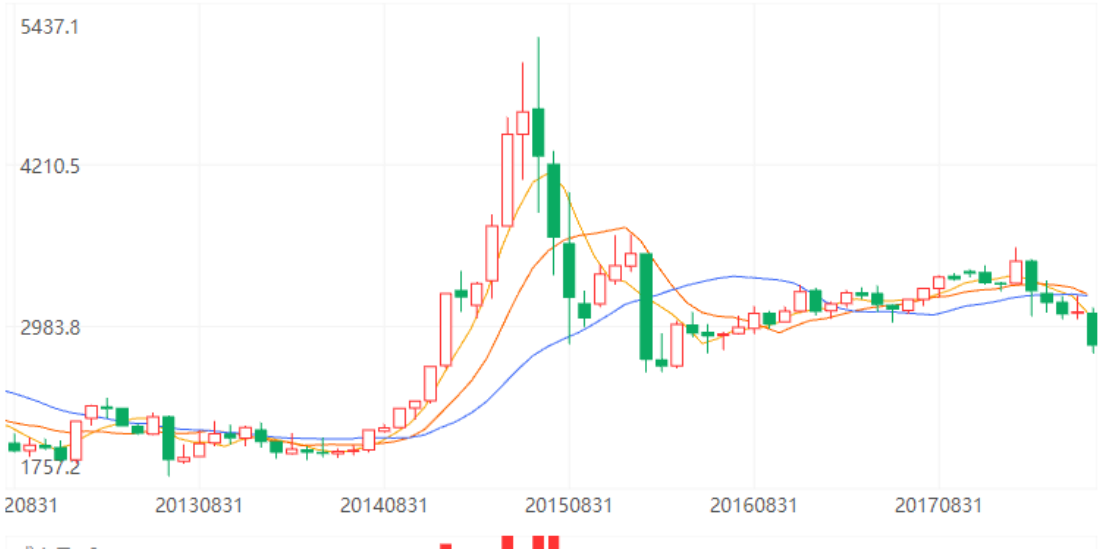

Figure 1: Historical Trend of SSE Index

Following that, this research will use an event study to examine the impact of recommendation revisions on stock prices. The final step involves analyzing the market reaction to recommendation revisions through cross-sectional regression.

4.4.1 Descriptive Statistics

In the first step of the quantitative analysis, descriptive statistics will be used on the entire sample obtained from Choice.

To begin with, this study proposes a table generating annual descriptive statistics regarding the number of firms covered each year, the number of brokers, and the number of analysts. Additionally, the table provides the average number of analysts covering the companies, the average number of analysts in the brokerage firms and the annual average rating. Afterwards, these descriptive statistics will also apply to bull markets and bear markets for comparison.

The next step is to determine the frequency distribution of the recommendations for each of the three rating scales: buy, hold, and sell. A strong buy recommendation falls under group buy and a strong sell recommendation falls under group sell.

In a third step, descriptive statistics will be applied based on the industry level. The industry is classified according to GICS (Global Industry Classification Standard). The table shows the number of recommendations based on the corresponding industry, the numbers of firms involved in each industry, the average recommendation, broker, analyst, and average rating for each industry. The purpose of this table is to determine whether brokerage analysts have a preference for a particular industry.

Fourthly, this study will apply descriptive statistics related to analysts' recommendations to each firm covered in the FTSE China A50 index. These statistics reveal the number of analysts per company as well as the number of brokerages per company, together with the average and median rating for the corresponding firm. This table is intended to determine whether analysts and brokers have a preference for certain firms with some specific characteristics. For example, whether analysts will make favorable recommendations to large companies.

Finally, all possible recommendation revisions will be evaluated in accordance with a matrix of recommendation change. In this research, there are two matrices: one focuses on the total sample, while the other excludes revisions with firm events. The matrix will display the number of recommendations that have changed from one rating to another one. Using a matrix can clearly display where the majority of recommendations are grouped and identify the number of upgrades and downgrades. Moreover, the matrix shows how many upgrades have taken place or how many downgrades have taken place during the entire sample period. The first matrix captures the revision distribution in the total sample, and the second matrix captures the revision distribution for revisions without firm events.

4.4.2 Event Study and Cross-Sectional Regression Analysis

A quantitative investigation of the stock market reaction to analysts' recommendation revisions is conducted by using an event study and a cross-sectional regression model. Event study methodology has been widely used in previous research, like Stickel (1995), and Womack (1996).

4.4.2.1 Event study

An event study has been applied to examine the stock price performance following the brokerage analysts' recommendation revision. The methodological framework is based on the event study proposed by Bowman (1983). The term residual analysis is also used to identify this method.

According to Bowman (1983), the structure of an event study involves the following steps:

Determine the event and timing of the event

In this case, the event concerned the recommendation revisions issued by different analysts at different times for different stocks. The first step is to determine the timing of the event. The event day is identical to the exact date on which the recommendation was announced obtained from the CHOICE database. According to Bowman (1983), all events occurring at a different time must be standardized to the event day, where t=0. In this case, each event from different calendar dates will be combined into one integrated sample. With this method, it is possible to specify periods relative to the zero time when a particular event occurred. An overview of the event study's timeline can be found in figure 2.

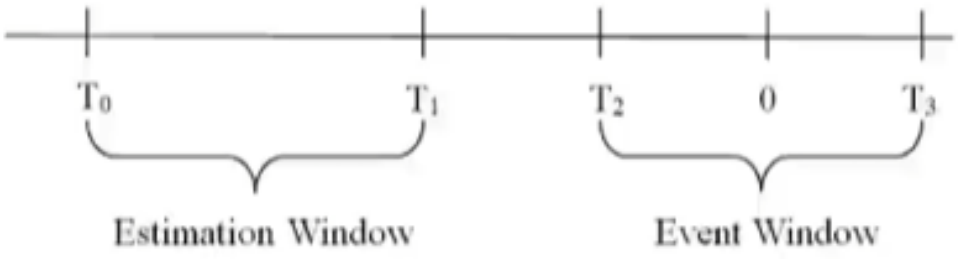

Figure 2: Timeline of the basic event study (Bowman, 1983)

In figure 2, the data from the estimation window are used to estimate the parameters to determine the expected return. Generally, the event window itself is not included in the estimation window to avoid any influence of the event on the estimation of the normal

return parameter. In this study, the estimation window ranged from T_0=-150 to T_1=-30.

Event windows are the time periods during which stock prices will be examined in response to a particular event. In order to account for the uncertain announcement date of the analysts' recommendations, the event window was widened to a few days before the CHOICE recorded announcement date. Also, brokerage firms and analysts are possible to inform specific investors about recommendations revisions before the announcement date. In this case, extending the event window around the event date may be beneficial for capturing pre-event drifts and determining whether there has been an information leak in the Chinese stock market. T2 = -20 to T3 = +120 is the final event window based on the results from Stickel (1995) and Womack (1996). Stickel (1995) found a significant pre-event drift occurring 20 days prior to the event date, and Womack (1996) found that post-event drift could last for more than 6 months (-9%).

Calculate the expected return for the stock assuming no revision occurs

The second step is to specify a benchmark that will be used to calculate the expected stock return under the circumstances that the event did not happen. This thesis uses the CSI 300 index (Shanghai and Shenzhen index 300) as a benchmark. CSI 300 is a capitalization-weighted index intended to replicate the performance of the largest 300 listed companies on the Chinese stock market, which is similar to the S&P 500 in the American stock market. A further benefit of CSI 300 is that it includes stocks covered in the FTSE China A50 index.

The next step involves selecting a statistical model for calculating the expected return.

The correct model is an essential component of an event study to determine the price reaction of securities. A number of models are used in event studies to calculate abnormal returns, including the market model, OLS single factor (market) model, and Fama-French three-factor model. The OLS model is applied in this thesis. Here is the expression for the OLS model:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \quad (1)$$

R_{it} is the return on stock i at time t, α_i and β_i are constant parameters for stock *i*. β_i refers to the sensitivity of return on stock i (R_{it}) with the market. Since market sensitivity varies from stock to stock, stock returns must be adjusted for beta differences. R_{mt} is the return on the market portfolio at time t, which is the CSI300 in this research. The random variable ε_{it} is the residual or disturbance term of the model.

The normal returns are calculated on the basis of the estimation period (T2 = -150 and T3 = -30). The following formula is used to calculate expected returns:

$$ER_{it} = \alpha_i + \beta_i R_{mt} \quad (2)$$

To estimate the parameters of this model, this research uses the Ordinary Least Squares (OLS) regression method. Next, residuals are calculated based on the estimated parameters $_i$ and $_i$. In this sense, abnormal returns during the event period can be calculated from the residuals of (1) as:

$$\varepsilon_{it} = R_{it} - (\alpha_i + \beta_i R_{mt}) \quad (3)$$

According to Bowman (1983), error term expectations and OLS estimation assumptions are related as follows:

$$E(\varepsilon_{it} | \varepsilon_{mt}) = 0 \; for \; i = 1 \; to \; N \qquad (4)$$

This implies that the expected value of abnormal returns is zero in an efficient market environment. Any value greater or less than zero in residuals is considered to be an abnormal return, since the expected value of the residuals is supposed to be zero.

The second assumption implied by setting the conditional expectation in (4) equal to zero is that the error term is uncorrelated with the market return.

Another assumption is that stock returns are uncorrelated. This also implies no cross correlation of residuals.

$$E(\varepsilon_{it}, \varepsilon_{jt}) = 0 \; for \; i, j = 1 \; to \; N, i \neq j$$

As the last assumption, homoscedasticity ensures that all error terms will have the same variance.

$$Var(\varepsilon_i) = \sigma^2 \; for \; i = 1 \; to \; N$$

A violation of the assumption occurs when error terms have non-constant variance, which may vary according to the independent variables. This is known as heteroscedasticity. The presence of heteroscedasticity implies that the standard errors of the OLS are biased. The residual plot can be used to determine whether outliers and heteroscedasticity are present. Nevertheless, this approach has limited value as residual plots do not reveal any test results. Therefore, it would be prudent to perform statistical analysis.

Generally, the Breusch-Pagan test can be used to test heteroskedasticity and it is easy to do in the Stata. Here is the hypothesis of the Breusch-Pagan test:

H0: The variance of the error is constant

H1: The variance of the error is not constant and depends on the independent variable

It is necessary to estimate the auxiliary regressions for the Breusch-Pagan test using the residuals (ε) of (1).

$$u^2 = \gamma_0 + y_1 x + v$$

This is a chi-square test, in which the test statistic is calculated as χ^2 = N* $\frac{2}{\varepsilon}$ and the degrees of freedom are equal to the number of explanatory variables except for the constant term. If the obtained p-value is less than a certain threshold (0.05), the null hypothesis is rejected and heteroskedasticity is considered to exist (Coenders & Saez, 2000).

Abnormal returns

After calculating the expected return, the next step is to determine the abnormal returns, which is the difference between actual returns and expected returns over the event window.

$$AR_{it} = R_{it} - E(R_{it})$$

Where R_{it} is the actual return on stock i at time t and $E(R_{it})$ is the expected return based on the OLS model. Abnormal returns are determined over the event window (T2=-20 to T3=+120), where t = 0 is associated with the recommendation date, as described in the previous step. Therefore, AR_{i0} indicates the abnormal return on the recommendation date and AR_{it} shows an abnormal return on t days after the recommendation date.

This research consists of an event study with multiple stocks and multiple events. Specifically, as each company may have multiple revisions from different analysts (more than one event for the same company), the relative events are treated as if they belonged to separate firms. In this case, an abnormal returns matrix can be developed as follows:

$$\begin{bmatrix} AR_{i,t1} & \dots & AR_{N,t1} \\ \vdots & \dots & \vdots \\ AR_{1,-1} & \dots & AR_{N,-1} \\ AR_{1,0} & \dots & AR_{N,0} \\ AR_{1,1} & \dots & AR_{N,1} \\ \vdots & \dots & \vdots \\ AR_{i,t2} & \dots & AR_{N,t2} \end{bmatrix}$$

In the matrix, each column indicates the abnormal returns for stock *i* throughout the event window (time-series). Comparatively, each row represents the abnormal return for total stocks at time t (cross-section).

When examining abnormal returns in this thesis, it is necessary to separate the abnormal return into two different groups (buy and sell), as the recommendation changes can be either positive or negative. Afterwards, the abnormal returns are averaged to get the average influence on the revision for the entire sample at time t, also known as average abnormal returns. The following equation represents the average abnormal returns (AAR) for all observations at time t.

$$AAR_t = \frac{1}{N}\sum_{i=1}^{N} AR_{it}$$

The impact of an event is measured from the start of the event period T2 to the end of

the event period T3, by adding together the individual abnormal returns to obtain the cumulative abnormal returns (CAR). Here's the formula:

$$CAR_i = \sum_{T2}^{T3} \quad AR_{it}$$

The final step aims at calculating cumulative average abnormal returns (CAARs), which aggregates CARs over the whole sample. In this research, the CAAR represents the total average price reaction to revisions between T2 and T3. Here is the equation for CAAR:

$$CAAR_i = \frac{1}{N} \sum_{i=1}^{N} \quad CAR_{it}$$

Where N equals the number of upgraded or downgraded revisions in the corresponding sample. T2 and T3 refer to the period of the event window.

T-test

Finally, this study will determine whether the Abnormal return (AR), average abnormal return (AAR) and cumulative average abnormal return (CAAR) are statistically significant from zero. Brown & Warner (1980) proposed a dependency adjustment t-test that is suitable for stocks with large sample sizes and frequent transactions. Therefore, this study used this test to test the significance of AAR and CAAR. A major advantage of this test is that it utilizes the estimation window to estimate the standard deviation of AAR in order to compensate for the dependency relation between events. Here is the null hypothesis:

$$H_0: E(AR_{i,t}) = 0$$

The null hypothesis assumes that there are no abnormal returns throughout the period. The test statistic is assumed follow a t distribution with N-1 degrees of freedom. In order to use a t-test, it is necessary to determine whether the residuals are normally distributed (the residuals are abnormal returns in this case). This study uses the natural logarithmic return and relies on the central limit theorem as mentioned before. The central limit theorem indicates that large samples of identically, independently distributed random variables will follow a standard normal distribution approximately. The denominator of the test statistic is the standard error of residuals (abnormal returns) which is distributed as the square root of a χ^2, so the t-ratio should follow a t-distribution. With a large number of observations in this study (about 18,000 observations), it is reasonable to expect that abnormal returns would follow approximately a standard normal distribution. The t-value is compared with the critical t-value to determine whether the results are statistically significant at 0.01, 0.05 and 0.1 levels.

Similarly for AAR and CAAR, the t-statistics can be formulated as follows.

The test statistic of AAR is:

$$t = \frac{AAR_t}{\hat{\sigma}_{AAR}}$$

Where:

$$\hat{\sigma}AAR = \sqrt{\frac{\sum_{t=t2}^{t=t3} (AAR_t - \underline{AAR})^2}{t3 - t2 + 1}}$$

$$\underline{AAR} = \frac{\sum_{t=t2}^{t=t3} AAR_t}{t3 - t2 + 1}$$

Where $\hat{\sigma}AAR$ is the standard deviation of AAR, $\underline{AAR}$ is the mean of AAR over the event window.

The test statistics of CAAR are:

$$t = \frac{CAAR_t}{(T_2 - T_1 + 1)^{\frac{1}{2}} \hat{\sigma}_{AAR}}$$

Where T2-T1 is the length of the estimation window.

4.4.2.2 Cross-sectional regression

The event study provides evidence regarding the impact of recommendation revisions on stock prices, followed by applying a cross-sectional regression model to investigate the characteristics of the stock price performance associated with recommendations. The regression model will incorporate the cumulative abnormal returns derived from the event study as a dependent variable and the cumulative abnormal returns are regressed on selected independent variables.

In general, a convincing cross-sectional regression should satisfy the following assumptions (Poole & O'Farrell, 1971):

- An independent and dependent variable should have a linear relationship.
- Multicollinearity not present or very little: there is no or very little multicollinearity in the data. An indicator of multicollinearity is a highly

correlated set of independent variables with each other.

- Autocorrelation is low or nonexistent: The data are not autocorrelated. Autocorrelation is a measure of the correlation between the same variables over successive time intervals.
- Homoscedasticity. It indicates that the variance of the errors is constant. The homoscedasticity will bias test statistics and impact significance values.

Multicollinearity, autocorrelation, and homoscedasticity are three of the most important assumptions. Before regressing, the validity of these assumptions will be verified.

Multicollinearity

Multicollinearity of independent variables is generally determined by correlation matrices. The term multicollinearity refers to the presence of more than two variables which are significantly correlated. As a result, this study will establish a multicollinearity matrix to illustrate the specific correlation between each independent variable. Correlation coefficients fall between -1 and 1, so when the absolute number runs close to 1, then the correlation is strong and multicollinear (Poole & O'Farrell, 1971). This research will perform regression separately for correlated variables if multicollinearity exists.

Autocorrelation

Residual autocorrelation produces unreliable standard errors, t-values, and p-values (Poole & O'Farrell, 1971). This research focuses on recommendations, most of which

are clustered and issued simultaneously; details can be found in the results. Thus, autocorrelation occurs in this study, and this study will adjust the autocorrelation in Stata using robust standard errors, where “cluster” is used in Stata.

Homoscedasticity

Homoscedasticity indicates a constant variance in the errors. In other words, different values of the independent variable correspond to similar variations in the dependent variable. Statistical tests will be biased by heteroskedasticity, and this will have an impact on significance values. This research will plot residuals first, and then apply the Breusch-Pagan/Cook-Weissberg test for heteroscedasticity. The variance will be adjusted if heteroskedasticity exists in this study using "robust" in Stata.

Hypothesis development and regression analysis

This section discusses the development of the main hypotheses and the selection of variables used in the regression analysis.

Hypothesis 1: Brokerage analysts are more likely to issue favorable recommendations and less likely to issue unfavorable recommendations.

Hypothesis 1a: Additionally, analysts tend to issue favorable recommendations in the bull market and unfavorable recommendations in the bear market.

The first part of the hypothesis has been widely supported by previous researchers (Elton, Gruber & Grossman (1986), Stickel (1995), Womack (1996), Barber, et al (2001), Jegadeesh et al (2004), Barber, Lehavy & Trueman (2007)). In the previous

literature, the percentage of buy recommendations is approximately 60%, the hold recommendations are 35%, and the sell recommendations make up the remaining 5%. One exemption is Souček & Wasserek (2014), who found that sell recommendations account for more than 20% of the German market.

The second part of the hypothesis is aimed at finding whether market sentiment can influence the brokerage analysts' decisions. There is substantial evidence that stock recommendations and investor sentiment are positively correlated (Bagno, Clement & Crawley (2009), Kaplanski & Levy (2010), Corredor, Ferrer & Santamaría (2011)). That is, brokerage analysts tend to issue favorable recommendations during times of high market sentiment and unfavorable recommendations during times of low market sentiment. Corredor, Ferrer & Santamaría (2011) concluded that this relationship is robust and holds not only in the US market but also in the European markets. Thus, this research aims to find out whether this relationship exists in the Chinese market. It is hypothesized that there is a positive relationship between recommendation and market sentiment.

The hypothesis will be tested by applying descriptive statistics of sell and buy recommendations across different market phases.

Hypothesis 2: Analysts tend to focus mostly on certain firms or industries.

The purpose of this hypothesis is to determine whether cluster effects exist in some industries covered by analysts. Juergens (1999) concluded that analysts are more likely

to issue recommendations for firms in the information technology industry. According to Loh & Stulz (2011), revisions tend to be made at smaller companies with higher institutional ownership, lower volatility, and fewer turnovers.

This research will provide descriptive statistics based on the industry level and firm level to identify if there is a preference among the analysts' recommendations. At an industry level, the table will include the number of firms and recommendations covered per industry, the average recommendations per firm within the corresponding industry, the average number of brokers and analysts covered per industry, and the average rating per industry. At the firm level, the table will contain the industry, the number of recommendations covered by each firm, and average and median ratings for each firm.

Hypothesis 3: "Piggyback" theory exists in the Chinese brokerage analysts

The Piggyback theory was firstly proposed by Altınkılıç & Hansen (2009), who found that analysts are likely to piggyback their recommendations and revisions on prior firm news. Furthermore, most of the return after the announcement can be attributed to firm events rather than the recommendation itself. As a result, this research assumes that the piggyback theory also exists in the Chinese stock market.

The hypothesis will be tested by establishing two different recommendation change matrices. In one case, the sample is total, and in another case, the sample does not contain any firm events. The matrix includes the total number of recommendations, the distribution of recommendations and revisions, as well as their percentages.

Hypothesis 4: Brokerage analysts' revisions contain information relevant to different types of markets

This hypothesis indicates that brokerage analysts' revisions can influence the price in the direction they expected in a normal market, a bull market and a bear market. Li, et al. (2014) reported that upgrades have an average announcement return of 3.1% during a 3-day window, while downgrades have an average abnormal return of -4.06% during the same time window. According to Crane & Crotty (2020), 93% of analysts who make revisions following non-news days can produce new information as well. Therefore, this research assumes that the Brokerage analysts' revisions have information content.

In order to test this hypothesis, four event studies will be conducted. In the first two event studies, the OLS model was applied to the total sample as well as to the sample without firm events. The purpose is to find out whether analysts can produce new information on non-news days across the whole period. Another two-event study focuses on the revisions without firm news in both the bull market and the bear market. The purpose of these two event studies is to determine whether revisions contain information about bull and bear markets.

Additionally, this hypothesis will be retested by including the dummy variable in regression analysis. TYPE indicates the market type (bull or bear market). If the recommendation revision occurred in a high sentiment market (bull market), it takes the value of one, and if it occurred in a low sentiment market (bear market), it takes the value of zero.

Hypothesis 5: Recommendation revisions for firms with high coverage have a lower price reaction.

The purpose of this hypothesis is to indicate whether analyst and brokerage coverage affects investment value. According to Branson, Guffey & Pagach (1998), the price reaction for lightly followed firms is larger than heavily followed firms for small firms. Regarding this research on the 50 largest Chinese listed companies, it is questionable whether the result is also true for large firms. It is expected that a company with high analyst coverage will experience a lower market reaction than a company with low analyst coverage.

In this case, analyst coverage (ANALYST) and brokerage coverage (BROKERAGE) is included as independent variables. Analyst coverage is calculated as the number of analysts who revised their recommendations during the sample period. Brokerage coverage is calculated as the number of brokerages covered during the sample period. The coefficient is expected to be negative (positive) for buy (sell) groups, as the hypothesis indicates a negative relationship between coverage and abnormal returns.

Hypothesis 6: Brokerage analysts make a significant contribution to price discovery.

Analysts consider stock prices to be undervalued when recommending buys. On the contrary, analysts consider stock prices to be overvalued when recommending sells. The previous literature indicates that the market reacts more strongly to strong buy and strong sell recommendations (Stickel (1995), Womack (1996)). In this case, brokerage analysts are improving market efficiency by facilitating the identification of

undervalued and overvalued stocks.

The regression model includes the dummy variable DISCOVERY to test this hypothesis. Regarding the buy group, DISCOVERY has a value of one if the recommendation is upgraded to a strong buy and a value of zero if the recommendation is upgraded to a buy. The coefficient is expected to be significantly positive, as previous literature has demonstrated that strong buy recommendations have a positive impact on stock prices. With respect to the sell group, DISCOVERY has a value of one if the recommendation is downgraded to a strong sell and a value of zero if the recommendation is upgraded to a sell. It is expected that the coefficient will be significantly negative, as previous literature has shown that strong sell recommendations negatively affect stock prices.

Moreover, analysts are expected to have a greater impact on stock prices if they change their ratings by skipping a rank (e.g., from sell to hold to buy) (Stickel (1995), Womack (1996)). According to Stickel (1995), a change from buy to strong buy involves a smaller price reaction than a change from buy to strong buy. In this case, the regression model includes the dummy variable SKIP as an independent variable. SKIP has a value of one if the recommendation revisions skip at least a rank. The SKIPS takes the value zero if the recommendation revision does not skip a rank. A positive coefficient can be expected for the buy group and a negative coefficient for the sell group.

Thus, this is the final multiple regression equation that will be used in this study.

$$CAR_{t,T} = \alpha + \beta_1 Analyst + \beta_2 Brokerage + \beta_3 Discovery + \beta_4 Skip + \beta_5 Type + \in$$

5.0 Empirical Results

The empirical results for each of the statistical analyses described in the method will be presented in this chapter. In this chapter, the first section presents descriptive statistics on the entire recommendation sample, as well as the sample during a bull market and a bear market. The following sections present the results of the event study and cross-sectional regression to determine the market's reaction to the revisions. In the last section, an additional test will be conducted to make the result more reliable.

5.1 Descriptive analysis

Table 1 presents annual descriptive statistics of brokerage analysts' recommendations between 2012 and 2020. Column 3 indicates that there have been steady increases in the number of brokerage firms from 53 brokerage firms in 2012 to 71 brokerage firms in 2020, with an average of 57 brokerage firms. However, the number of analysts in brokerage firms in column 4 does not increase steadily as the number of brokers did. As shown in column 4, the number of analysts decreased steadily between 2012 and 2016 and then increased rapidly between 2016 and 2020, with an average of 475 analysts covered in the sample. There may be a reason why the boundary year is 2016 since the Chinese stock market experienced a bull market between 12th March 2014 and 19th June 2015 and a bear market between 19th June 2015 and 29th January 2016. The volatile market can lead brokerage analysts to be cautious and unwilling to issue frequent recommendations. Column 5 displays the average number of analysts covered

in the brokerage firm. In line with column 4, the average number of analysts employed by brokerage firms decreases before 2016, then increases rapidly, with an average of 8 analysts per brokerage firm. Considering that the average number of analysts employed by brokerage firms can be influenced by large brokers, such as BOC International (China) Co., Ltd, China International Capital Corporation Limited, which employed more than 30 analysts, it is more appropriate to use the median number as a measure of analysts per brokerage firm. According to column 6, the median number of analysts per brokerage firm steadily decreased before 2015 and increased after 2015, with an average median number of 4.94 analysts employed by brokerage firms. This result suggests that analysts in large brokerage firms are most affected by market volatility. Columns 7 and 8 display how many analysts follow a firm on an average and median basis. Analysts following a company on average (median) fell from 19.3 (20) in 2012 to 13 (12) in 2016, then increased to 26.42 (24.5) in 2020. Additionally, it is interesting to find that the mean number of analysts covered per firm (column 7) is larger than the median number (column 8) since 2016. This suggests that brokerage analysts may be willing to make recommendations for firms with unique characteristics since 2016. Column 9 indicates that the average rating scale remains around four for each year (1-strong sell, 2-sell, 3-hold, 4-buy, 5-strong buy). It suggests that brokerage analysts are likely to issue buy recommendations since all the average ratings are around 4.

year	number of firms	Number of brokers	Number of analysts	Analysts per brokers	Brokerage median	Analysts per mean	covered firm Median	rating average
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
2012	50	53	419	7.90566	5	19.3023	20	3.83
2013	50	48	383	7.97917	4.5	17.907	18	3.89
2014	50	49	357	7.28571	3	16.6136	16	3.86
2015	50	51	316	6.19608	3	14.7872	15	3.75
2016	50	50	315	6.3	5	13.3333	12	3.88
2017	50	56	495	8.83929	5	20.1042	18	3.97
2018	50	65	634	9.75385	7	22.5	20	3.98
2019	50	66	640	9.69697	6	23.8	23	3.99
2020	50	71	717	10.0986	6	26.42	24.5	3.9
Average		*56.556*	*475.11*	*8.2284*	*4.94444*	*19.419*	*18.5*	*3.8944*

Table 1: Descriptive Statistics

Table 2 presents descriptive statistics of brokerage analysts' recommendations during the bull and bear market. The number of brokers in the bull market is the same as that in 2015 which shows in table 1, indicating that all brokers are actively issuing recommendations. It suggests that the brokers are likely to issue recommendations during the bull market. While in the bear market, this number decreases to 38, indicating that brokers are less likely to issue recommendations during a bear market. As shown in columns 5 and column 6, the average and the median number of analysts per broker in the bull market is significantly larger than those across the entire period and those in the bull market. It suggests that analysts are likely to issue a recommendation in the market with a high sentiment. Columns 7 and 8 indicate how many analysts follow a firm on an average and median basis. The average and the median number of analysts covered per firm in the bull (bear) market is higher (lower) than the number of analysts covered in the normal market as shown in table 1. The results in column 9 are interesting. In both bull and bear markets, the average rating is higher than the average rating over the sample period, as shown in table 1. Furthermore, the rating in the bear market (4.04) is higher than the average rating in the bull market (3.96). This indicates that analysts are more likely to issue buy and buy recommendations during a bear market than in

other markets.

Overall, Table 2 indicates that Chinese analysts and brokerage firms issue more recommendations in bull markets and fewer recommendations in bear markets. Additionally, most of the recommendations issued in the bear market are buy and strong buy.

year	*number of firms*	*Number of brokers*	*Number of analysts*	*Analysts per brokers*	*Brokerage median*	*Analysts per mean*	*covered firm Median*	*rating average*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
bull market (12th March 2014 ~ 19th June 2015)	50	51	406	7.960784	4	20.06667	19	3.958601
bear market (19th June 2015 ~ 29th January 2016)	50	38	192	5.052632	3	8.361702	8	4.035162

Table 2: Descriptive statistics for bull and bear market

Hypothesis 1:

The first hypothesis indicated brokerage analysts are more willing to issue favorable recommendations and less likely to issue unfavorable recommendations. Additionally, analysts tend to issue more favorable recommendations in the bull market and unfavorable recommendations in the bear market. This hypothesis is tested by analyzing the distribution of brokerage analysts' recommendations in the different sample periods.

Figure 3 plots the distribution of brokerage analysts' recommendations over the sample

period from 2012 to 2020. Figure 3 illustrates that more than 60% of recommendations issued each year are buy recommendations, indicating that analysts are more likely to issue buy recommendations. The second most popular recommendation among analysts is a strong buy. It can be seen in figure 3 that the percentage of strong buys reached its peak in 2015, when the Chinese stock market was more volatile than normal. Furthermore, analysts are unwilling to recommend holds, sells, and strong sells, which represent less than 10% of recommendations during the study period. Therefore, it is in line with the previous literature that analysts are likely to issue buy recommendations instead of sell recommendations across the whole period.

Furthermore, it is noteworthy that both the percentage of strong buy and strong sell recommendations peaked in 2015 and then decreased significantly in 2016. In other words, analysts issue a greater number of strong buy and strong sell recommendations when the market is volatile.

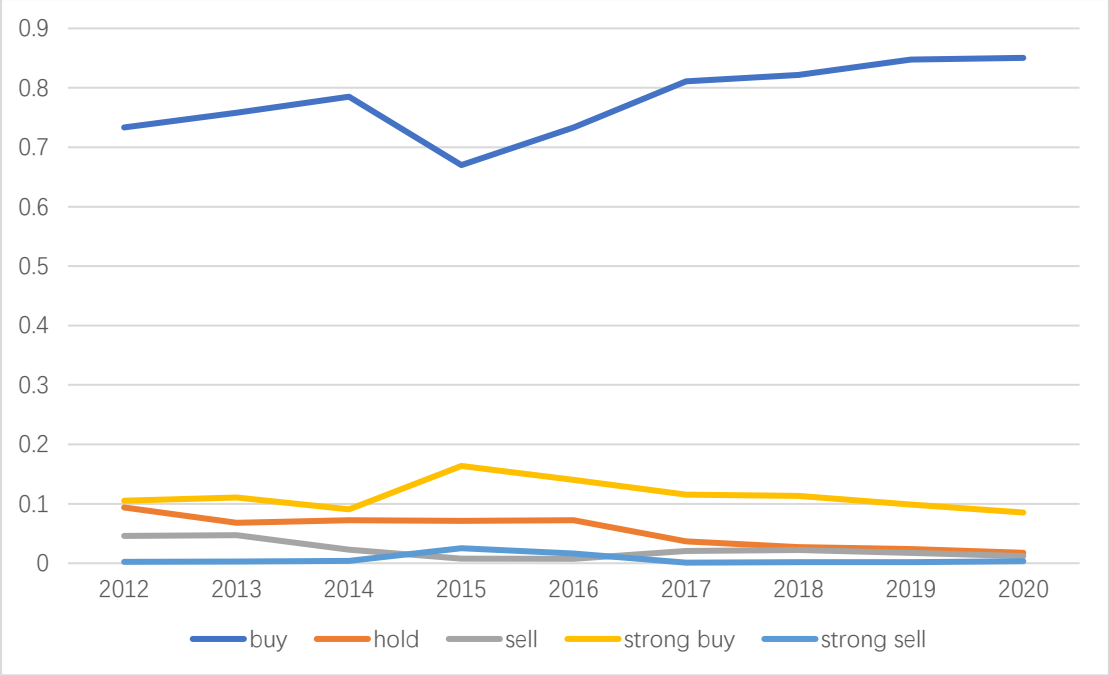

Figure 3: Annual distribution for the recommendation

Table 3 presents a basic summary of brokerage analysts' recommendations. It should be noted that the number of covered companies remains constant throughout the sample period because this research only covered the firms in the FTSE China A50. The sample includes 113 brokers and 17996 recommendations for the entire period. The ratings are based on a scale of 1-5, where a rating of 1 indicates a 'Strong sell' and a rating of 5 indicates a 'Strong buy'. Clearly, the average and median rating scale throughout the sample period is around 4 (buy recommendation), indicating that analysts are more willing to issue buy recommendations.

year	number of firms	Number of brokers	rating average	rating median	number of recommend ations
(1)	(2)	(3)	(4)	(5)	(6)
2012	50	53	3.83	4	1875
2013	50	48	3.89	4	1588
2014	50	49	3.86	4	1928
2015	50	51	3.75	4	1582
2016	50	50	3.88	4	1338
2017	50	56	3.97	4	2008
2018	50	65	3.98	4	2529
2019	50	66	3.99	4	2739
2020	50	71	3.9	4	2835
overall	*50*	*113*	*3.894444*	*4*	*17996*

Table 3: Descriptive statistics for recommendation

Table 4 shows the annual frequency for different types of recommendations throughout the sample period. In line with the result in table 1, the number of recommendations decreased from 1875 in 2012 to 1338 in 2016 and then doubled to 2835 in 2020 since the volatile market makes analysts cautious and unwilling to issue frequent recommendations. Interestingly, recommendations with the strong buy, sell, and strong sell tend to follow the opposite trend of the number of recommendations. The number of recommendations peaked around 2015 and then decreased thereafter. It appears that the extreme market sentiment will prompt analysts to issue more strong buy, sell and strong sell recommendations. In terms of the number of buy recommendations, they follow the same trend as the number of recommendations and the percentage of buy recommendations occupies at least 67% of the total recommendation throughout the sample period, indicating that analysts are likely to issue buy recommendations. It is interesting to note that between 2012 and 2020, both the number and percentage of hold recommendations decreased and were not related to the market sentiment. In addition,

the maximum percentage of hold recommendations is only 9.4% in 2012, which differs from previous literature where hold recommendations account for more than 30% of total recommendations (Womack (1996), Barber et al (2001)). One possible explanation for this phenomenon is the conflict of interest indicated in the background. Specifically, hold recommendations do not result in any transactions and therefore the broker will not earn any transaction costs, which will impact the analyst's bonus.

On average, 11.37% of Strong Buy recommendations, 77.90% of Buy recommendations, 5.38% of Hold recommendations, 2.26% of Sell recommendations, and 0.65% of Strong Sell recommendations were made on the firms included in the FTSE China A50 in this sample. There is a similarity between the results and previous research, but there is a difference between the numbers. Research has shown that buy recommendations accounted for approximately 60% of total recommendations, while hold recommendations accounted for 30% (Stickel (1995), Womack (1996), Barber et al. (1998)). A possible explanation for this is the difficulty of selling short on the Chinese stock market, which may result in analysts issuing more buy recommendations as compared to analysts in other countries.

year	*number of recommendations*	*strong buy*	*% of total*	*buy*	*% of total*	*hold*	*% of total*	*sell*	*% of total*	*strong sell*	*% of total*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
2012	1875	197	0.105067	1375	0.73333333	176	0.093867	86	0.045867	4	0.002133
2013	1588	176	0.110831	1204	0.7581864	108	0.06801	75	0.047229	5	0.003149
2014	1928	175	0.090768	1514	0.78526971	140	0.072614	44	0.022822	8	0.004149
2015	1582	259	0.163717	1060	0.67003793	113	0.071429	12	0.007585	40	0.025284
2016	1338	188	0.140508	981	0.73318386	97	0.072496	10	0.007474	22	0.016442
2017	2008	232	0.115538	1628	0.81075697	74	0.036853	41	0.020418	2	0.000996
2018	2529	286	0.113088	2078	0.82166864	69	0.027284	56	0.022143	4	0.001582
2019	2739	270	0.098576	2322	0.84775465	66	0.024096	48	0.017525	5	0.001825
2020	2835	242	0.085362	2411	0.85044092	50	0.017637	34	0.011993	9	0.003175
overall	*17996*	*2025*	*0.113717*	*14573*	*0.77895916*	*893*	*0.053809*	*406*	*0.022562*	*99*	*0.006526*

Table 4: Annual distribution for recommendations across the sample period

Table 5 shows the frequency of different types of recommendations in bullish and bearish markets. Bullish market recommendations include 10.57% of Strong Buys, 78.50% of Buys, 8.12% of Holds, 1.85% of Sells, and 0.01% of Strong Sells. When compared to the recommendation distribution shown in table 4, sell recommendations are lower, hold recommendations are higher and buy recommendations are not substantially different. Therefore, in a bull market, Chinese analysts are less likely to issue sell recommendations and are more likely to issue hold recommendations. It appears that analysts' recommendations are not valuable since they are expected to find bull markets and to issue more buy and strong buy recommendations.

In a comparison, bearish market recommendations include 21.94% of Strong Buys, 67.09% of Buys, 7% of Holds, 0.4% of Sells, and 3.5% of Strong Sells. Surprisingly, the percentage of strong buy recommendations in the bear market is significantly higher than in the bull market and for the entire sample period. Meanwhile, the percentage of strong sell recommendations has increased from 0.65% to 3.51%. The increase in the percentage of strong buys indicates that those analysts are not skilled as analysts should be able to detect bear markets and issue more sell recommendations. Investors who issue strong sell recommendations are skilled, but they are a very small group. This result is not consistent with Crane and Crotty (2020), who found that more than 93% of the investors are skilled.

year	number of recommend ations	strong buy	% of total	buy	% of total	hold	% of total	sell	% of total	strong sell	% of total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
bull market (12th March 2014 ~ 19th June 2015)	2488	263	0.10571	1953	0.7849678	202	0.08119	46	0.01849	24	0.00965
bear market (19th June 2015 ~ 29th January 2016)	711	156	0.21941	477	0.6708861	50	0.07032	3	0.00422	25	0.03516

Table 5: Distribution of recommendations in the bull and bear market

Over the entire sample period, a large majority of recommendations made in this sample were strong buys and buy recommendations, rather than sells and strong sell recommendations. Clearly, this finding confirms the first part of the first hypothesis that analysts are issuing mostly favorable recommendations, and they are reluctant to issue unfavorable recommendations. Michaley & Womack (2005) found some possible explanations for this optimism bias. To begin with, analysts are under pressure to make positive recommendations on companies with whom the investment bank has a relationship or intends to develop a relationship. Moreover, unfavorable recommendations could affect an investment bank's future business activities since a firm that receives an unfavorable recommendation may decide to move to another investment bank. Additionally, the reputational risk of an analyst making an incorrect sell recommendation is much greater than that of an analyst making an incorrect buy recommendation. Moreover, analysts may not issue sell recommendations in the Chinese stock market due to the limitations on short-selling and the conflict of interest between analysts and bonuses.

The second part of hypothesis one indicates that analysts tend to issue favorable recommendations during bull markets and unfavorable recommendations during bear markets. According to Table 5, Chinese analysts have issued fewer sell recommendations, more hold recommendations, and almost no change in buy recommendations in the bull market. While in the bear market, analysts are more likely to issue strong buy and strong sell recommendations. Therefore, the hypothesis can be partially accepted that analysts tend to issue unfavorable recommendations during a bear market but not issue more favorable recommendations during a bull market. These results indicate that most of the Chinese brokerage analysts are not skilled enough to detect bull and bear markets.

Hypothesis 2:

The second hypothesis postulates that analysts tend to focus mostly on certain firms and industries. In contrast to previous studies that examined whole companies, this empirical study provides descriptive statistics on analyst recommendations for all FTSE China A50 companies.

Table 6 shows the descriptive statistics based on the industry-level covered in this study. Column 2 displays the total number of recommendations for each industry. It is apparent that firms in the finance sector receive 5649 recommendations, which represents approximately 31.39% of the total recommendation, followed by firms in the consumer staples sector, which receive 3535 recommendations and represent approximately 19.64% of the total recommendation. However, the number of recommendations cannot demonstrate that analysts tend to focus on the certain industry

because the number of firms in each industry varies. A summary of the number of firms in each industry is provided in column 4, and a summary of the average number of recommendations per industry is provided in column 5. While finance companies receive the most recommendations, there are 19 firms in this sector and the average number of recommendations is only 298. Comparatively, companies in the consumer discretionary industry receive an average of 685 recommendations, followed by the companies in the real estate industry receiving an average of 655 recommendations. Therefore, Chinese brokerage analysts tend to issue recommendations to firms engaged in the consumer discretionary and real estate industries. It is worth noting that firms in the information technology industry only receive an average of 165 recommendations, indicating that Chinese brokerage analysts are least likely to issue recommendations to firms in information technology. This contrasts with Juergens (1999), who found that analysts are more likely to issue recommendations to firms in the information technology industry. Column 6 shows the average number of brokerage houses covered in the corresponding industry. There are on average 24 brokers who follow firms in the consumer discretionary industry, and on average 21 brokers who follow firms in the real estate industry. Column 7 indicates the average number of analysts per industry. Most analysts follow firms in the consumer discretionary sector, with 122 on average. Column 8 shows the average rating for each industry. The energy industry receives the lowest average rating, which is only 3.85. In comparison, analysts are more likely to give a favorable rating to the industry of necessary consumption, which has an average rating of 4.13.

industry (1)	*recommendation* (2)	*% of total* (3)	*number of firms* (4)	*average* (5)	*average broker* (6)	*average analyst* (7)	*average ratings* (8)
Energy	850	0.04723272	3	283.333333	14.66666667	56	3.854117647
Finance	5649	0.31390309	19	297.315789	3.736842105	27.94736842	3.964241459
Industry	1423	0.07907313	7	203.285714	8.285714286	48	4.005621926
Information technology	495	0.02750611	3	165	18	64	4.058585859
Materials	645	0.0358413	2	322.5	24	91	4.001550388
Medical & Health	725	0.04028673	2	362.5	27.5	95	4.012413793
Consumer staples	3535	0.19643254	6	589.166667	13.33333333	78	4.125601132
Real Estate	1964	0.10913536	3	654.666667	20.66666667	70.66666667	4.100305499
Telecom	445	0.02472772	1	445	43	120	4.040449438
Consumer discretionary	2053	0.11408091	3	684.333333	23.33333333	121.6666667	4.075499269
Utilities	212	0.0117804	1	212	28	78	3.933962264
overall	17996	1	50				4.015668061

Table 6: Industry-level descriptive statistics

Table 7 presents descriptive statistics on the FTSE China A50 index securities. The rating is based on a rating scale in which 1 represents a 'Strong sell', 2 represents a 'sell', 3 represents a 'hold', 4 represents a 'buy', and 5 represents a 'Strong buy', respectively. According to table 7, analysts prefer to cover firms in the consumer discretionary and real estate sectors, and hate recommending firms in the information technology sector. Specifically, the highest number of recommendations were made on securities related to consumer discretionary and real estate, such as SAIC Motor Corporation, China vanke, Poly Developments and Holdings Group and Gree Electric Appliances, Inc. of Zhuhai, while the lowest number of recommendations were made on 360 and Foxconn Industrial Internet, which belong to the information technology sector. Moreover, Kweichow Moutai received 955 recommendations, followed by SAIC Motor Corporation and China Vanke. As they are among the largest companies on the Chinese stock market, it indicates that analysts prefer to make recommendations in the case of large corporations.

Column 4 indicates that analysts are likely to give favorable ratings to firms in the consumer staples sector and unfavorable ratings to firms in the energy sector.

Specifically, analysts made the most favorable recommendation on firms in the consumer staples industry like Foshan Haitian Flavouring and Food, where an average rating of 4.20 was made, Inner Mongolia Yili Industrial Group with a rating of 4.17 and a rating of 4.13 for Wuliangye Yibin. Analysts made the least favorable recommendation on firms in the energy industry like Petrochina Company, where an average rating is only 3.48, and China Shenhua Energy Company with a rating of 3.91. It is interesting to note that the median rating is 4 for all firms included in the sample. Foshan Haitian Flavouring and Food received the highest consensus average rating of 4.20, while Petrochina Company received the lowest rating of 3.48, almost equal to a hold recommendation.

firms (1)	*industry* (2)	*Number of recommendations* (3)	*rating per mean* (4)	*rating per median* (5)
360	Information technology	60	4.183333333	4
S.f.Holding	Industry	218	3.922018349	4
Agricultural Bank Of China	Finance	244	3.967213115	4
Anhui Conch Cement Company .	Materials	398	4.012562814	4
Bank Of China	Finance	195	3.687179487	4
Bank of Communications	Finance	212	3.716981132	4
Baoshan Iron & Steel	Materials	247	3.983805668	4
BOB	Finance	225	4.044444444	4
CHINA CITIC BANK CORPORATION	Finance	213	4.103286385	4
China Communications Construction	Industry	150	3.953333333	4
China Construction Bank Corporation	Finance	237	3.82278481	4
CHINA EVERBRIGHT BANK	Finance	177	3.723163842	4
China Life Insurance Company	Finance	383	3.945169713	4
China Merchants Bank	Finance	461	4.095444685	4
China Merchants Shekou Industrial Zone Holdings	Real Estate	348	4.126436782	4
China Minsheng Banking	Finance	263	3.836501901	4
China Pacific Insurance	Finance	392	3.99744898	4
China Petroleum & Chemical Corporation	Energy	359	4	4
China Railway Construction Corporation	Industry	145	3.993103448	4
CHINA RAILWAY GROUP	Industry	157	3.898089172	4
China Shenhua Energy Company	Energy	298	3.919463087	4
China State Construction Engineering Corporation	Industry	351	4.065527066	4
China United Network Communications .	Telecom	445	4.040449438	4
China Vanke	Real Estate	882	4.106575964	4
China Yangtze Power	Utilities	212	3.933962264	4
CITIC Securities	Finance	411	4.160583942	4
CRRC Corporation	Industry	316	4.041139241	4
Foshan Haitian Flavouring and Food	Necessary Consume	457	4.194748359	4
Foxconn Industrial Internet	Information technology	67	4.014925373	4
Gree Electric Appliances, Inc.of Zhuhai	Unnecessary Consume	639	4.00312989	4
Guotai Junan Securities	Finance	136	3.911764706	4
HIKVISION DIGITAL TECHNOLOGY	Information technology	368	4.046195652	4
Industrial And Commercial Bank Of China	Finance	259	4.019305019	4
Industrial Bank	Finance	364	3.983516484	4
Inner Mongolia Yili Industrial Group	Necessary Consume	734	4.16893733	4
Jiangsu Hengrui Medicine	Medical & Health	513	4	4
Jiangsu Yanghe Brewery Joint-Stock	Necessary Consume	466	4.064377682	4
Kweichow Moutai	Necessary Consume	955	4.103664921	4
Midea Group	Unnecessary Consume	512	4.091796875	4
New China Life Insurance Company Ltd.	Finance	342	3.976608187	4
Petrochina Company	Energy	193	3.481865285	4
Ping An Bank	Finance	449	3.968819599	4
Ping An Insurance (Group) Company Of China	Finance	441	4.068027211	4
Poly Developments and Holdings Group	Real Estate	734	4.080381471	4
SAIC Motor Corporation	Unnecessary Consume	902	4.11751663	4
Shanghai International Port (Group)	Industry	86	4.151162791	4
Shanghai Pudong Development Bank	Finance	245	3.779591837	4
Shenzhen Mindray Bio-Medical Electronics	Medical & Health	212	4.04245283	4
Wens Foodstuff Group .	Necessary Consume	189	4.021164021	4
Wuliangye Yibin	Necessary Consume	734	4.133514986	4

Table 7: Firm-level descriptive statistics

Table 8 presents the analyst coverage and brokerage coverage of each firm included in the FTSE China A50 index. The average number of analysts per firm is shown in column 6 and column 4 shows the average number of brokers covering a company. Table 8 shows an apparent preference for certain sectors by analysts. With respect to the consumer discretionary industry, on average, 29 analysts cover SAIC Motor

Corporation, 21 analysts cover Gree Electric Appliances, Inc. of Zhuhai, and 16 analysts cover Midea. Overall, 19 analysts monitored the consumer discretionary industry during the sample period. Regarding the real estate sector, China Vanke is covered by an average of 24 analysts, Poly Developments and Holdings Group by an average of 22 analysts, and China Merchants Shekou Industrial Zone Holdings by an average of 11 analysts. There are 16 analysts following the real estate industry on average during the sample period. In contrast, the information technology sector receives less coverage. There are on average 5 analysts covering Foxconn Industrial Internet, 6 analysts covering 360, and 15 analysts covering HIKVISION DIGITAL TECHNOLOGY on average. The information technology industry was followed by nine analysts on average over the sample period. In accordance with the conclusions from tables 6 and 7, it is evident that analysts tend to follow certain industries.

Additionally, Kweichow Moutai is the biggest Chinese listed firm whose capitalization is more than two trillion Chinese yuan. According to table 8, Kweichow Moutai is followed by more than 68 brokers and 244 analysts, which is the largest number in both columns. In addition to Wuliangye Yibin, the second-largest listed company in the Chinese stock market, followed by 66 brokers and 217 analysts. As a result, analysts tend to focus on the top large companies.

firms (1)	*industry* (2)	*number of brokerage* (3)	*brokerage mean* (4)	*number of analyst* (5)	*analyst mean* (6)
S.f.Holding	Industry	31	7.777777778	68	8.703980747
360	Information technology	21	3.888888889	34	5.548094542
Agricultural Bank Of China	Finance	32	11.77777778	104	11.92679719
Anhui Conch Cement Company .	Materials	41	15.66666667	123	17.17439047
Bank Of China	Finance	27	9.333333333	90	11.09538586
Bank of Communications	Finance	31	10.33333333	91	10.97796176
Baoshan Iron & Steel	Materials	31	8.777777778	70	9.600758036
BOB	Finance	29	11.33333333	99	12.3618213
CHINA CITIC BANK CORPORATION	Finance	31	10.22222222	93	11.21500754
China Communications Construction	Industry	24	6.888888889	61	7.682283317
China Construction Bank Corporation	Finance	30	11	102	12.0567984
CHINA EVERBRIGHT BANK	Finance	30	9.333333333	95	9.888635382
China Life Insurance Company	Finance	37	13.22222222	129	14.47426439
China Merchants Bank	Finance	46	17.55555556	156	18.28491443
China Merchants Shekou Industrial Zone Holdings	Real Estate	29	10.11111111	83	10.89076129
China Minsheng Banking	Finance	35	11	96	11.39855728
China Pacific Insurance	Finance	36	14.11111111	136	14.49819126
China Petroleum & Chemical Corporation	Energy	29	10.88888889	84	11.83480738
China Railway Construction Corporation	Industry	25	7.333333333	64	8.067019129
CHINA RAILWAY GROUP	Industry	25	6.666666667	65	7.452464437
China Shenhua Energy Company	Energy	33	10.22222222	84	10.22421962
China State Construction Engineering Corporation	Industry	28	11.33333333	93	11.49053399
China United Network Communications .	Telecom	43	13.88888889	120	14.86516699
China Vanke	Real Estate	53	22.33333333	159	23.6501058
China Yangtze Power	Utilities	28	9.111111111	78	9.56914146
CITIC Securities	Finance	48	16.88888889	154	16.92266163
CRRC Corporation	Industry	43	14.77777778	127	14.90477615
Foshan Haitian Flavouring and Food	Necessary Consume	53	18	154	19.6300108
Foxconn Industrial Internet	Information technology	16	3.333333333	29	4.828812145
Gree Electric Appliances, Inc. of Zhuhai	Unnecessary Consume	51	19.11111111	153	21.01360897
Guotai Junan Securities	Finance	26	7	60	7.346068871
HIKVISION DIGITAL TECHNOLOGY	Information technology	46	14.88888889	137	15.22698142
Industrial And Commercial Bank Of China	Finance	35	12.44444444	117	13.33416783
Industrial Bank	Finance	44	16	135	16.40757865
Inner Mongolia Yili Industrial Group	Necessary Consume	62	24.55555556	210	25.52299902
Jiangsu Hengrui Medicine	Medical & Health	50	17.33333333	150	19.17511362
Jiangsu Yanghe Brewery Joint-Stock	Necessary Consume	51	16.88888889	170	17.50472528
Kweichow Moutai	Necessary Consume	68	27.55555556	244	28.81411815
Midea Group	Unnecessary Consume	47	15.66666667	138	15.92094112
New China Life Insurance Company Ltd.	Finance	38	13.77777778	141	14.68294011
Petrochina Company	Energy	21	7.111111111	50	7.800461406
Ping An Bank	Finance	42	17.22222222	143	17.38317652
Ping An Insurance (Group) Company Of China	Finance	38	14.33333333	137	15.50403756
Poly Developments and Holdings Group	Real Estate	51	20.55555556	150	21.8620939
SAIC Motor Corporation	Unnecessary Consume	58	20.66666667	175	22.08188423
Shanghai International Port (Group)	Industry	17	3.888888889	29	4.894018264
Shanghai Pudong Development Bank	Finance	38	12.33333333	115	13.78649293
Shenzhen Mindray Bio-Medical Electronics	Medical & Health	31	6.222222222	54	7.501482985
Wens Foodstuff Group .	Necessary Consume	26	7.444444444	58	8.011646566
Wuliangye Yibin	Necessary Consume	66	25.22222222	217	25.69857138

Table 8: firm-level descriptive statistics

In general, tables 6, 7 and 8 support hypothesis 2 that analysts tend to follow certain industries. It has been found that analysts are more inclined to cover companies in the sectors of consumer discretionary and real estate and are less inclined to recommend firms in the information technology sector. Additionally, analysts are likely to give favorable ratings to firms in the sector of consumer staples, while unfavorable ratings are likely to be given to firms in the sector of energy. Therefore, the second hypothesis

will be accepted.

Hypothesis 3:

In light of the third hypothesis, it is concluded that there is a "Piggyback" theory among the Chinese brokerage analysts. This means that most of the recommendations issued by analysts are based on the firm's events. An analysis of the revision matrix will be conducted for the sample with and without firm events in order to test this hypothesis.

Table 9 displays an analysts' recommendation transition matrix, with each cell showing how many times a recommendation has been revised from its previous rating to a new rating. The observations on the diagonal indicate the reiterations of recommendations, while other observations illustrate the recommendation revisions. Observation under diagonal represents downgrade revisions, while observation upper diagonal represents upgrade revisions. As specified in the method, this table does not include recommendations that were issued only as an initial recommendation without any subsequent revisions during the sample period.

According to table 9, most analysts repeat their recommendations instead of revising them because the number in the diagonal is large. Particularly for the buy recommendation, where 12964 of 13054 are reiterations. It is also apparent that the majority of revisions are clustered around the rating of buy and hold, indicating that analysts generally revise their previously announced buy and hold recommendations. if a corporation has been rated a hold in the past, analysts are more likely to upgrade their recommendation to buy than downgrade it. Additionally, if a corporation has been rated

a strong buy in the past, analysts are more likely to downgrade the recommendation to buy.

As for the number of revisions, there are 398 upgrades and 272 downgrades. The number of upgrade revisions outweighs the number of downgrade revisions, indicating that analysts are unlikely to issue downgrade revisions. In addition, despite thousands of revisions, there are only a few that are downgraded to sell or strong sell. A possible explanation for this phenomenon is the restriction of short sales and the conflict of interests between analysts and bonuses in the Chinese stock market.

to recommendation :	*(1) strong sell*	*(2) sell*	*(3) hold*	*(4) buy*	*(5) strong buy*	*total*	*percentage*
From recommendation:							
(1) strong sell	19	5	1	24	7	56	0.0034893
(2) sell	0	209	4	97	13	323	0.0201259
(3) hold	4	6	552	195	16	773	0.048165
(4) buy	2	9	43	12964	36	13054	0.813384
(5) strong buy	2	3	26	177	1635	1843	0.1148358
total	27	232	626	13457	1707	16049	
percentage	0.0016823	0.0144557	0.0390055	0.8384946	0.1063618		100%

Table 9: Matrix for total sample

According to Loh & Stulz (2011), events such as earnings releases affect the stock price more than the recommendations of brokerage analysts. It is also called piggyback theory in Altınkılıç & Hansen (2009). This research followed Altınkılıç & Hansen (2009) by excluding recommendations that were issued within three days following a corporate event (earnings announcement, earnings guidance, financial transaction, et al).

Table 10 shows the distribution of events across the sample. There were more than 23.49% of recommendation revisions issued without firm events, while 76.5% were issued with firm events. It suggests that brokerage analysts are likely to piggyback their revisions on firm news. Regarding the event with firm events, most revisions issued following earnings announcements account for more than 72.9% of the total revisions, indicating that Chinese brokerage analysts are likely to issue revisions following earnings announcements.

	number	*percent*	*percent within firm events*
event without firm events	3770	0.234905602	
event with firm events:			
—Quarterly Report Review	3835	0.238955698	0.31232185
—semi-annual Report Review	2737	0.170540221	0.222900888
—Annual Report Review	2376	0.148046607	0.193501099
—other event	3331	0.207551872	0.271276163
	16049	1	1

Table 10: firm event distribution

Table 11 displays the transition matrix of analysts' recommendations after excluding those issued following firm events. With respect to the upgraded revisions, revisions from hold to buy are still clustered. Interestingly, the number of strong sells and sell to strong buys is zero. This indicates that analysts are unlikely to revise their opinion from sell to strong buy in the absence of firm events. When it comes to downgrading revisions, the revision from strong buy to buy is still the most popular. Furthermore,

there are 140 revisions for upgrades and 83 revisions for downgrades. Upgrades still outnumber downgrades, which indicates that downgrades are unlikely to be issued.

	to recommendation:	*(1) strong sell*	*(2) sell*	*(3) hold*	*(4) buy*	*(5) strong buy*	*total*	*percentage*
From recommendation:								
(1) strong sell		8	1	0	5	0	14	0.0008723
(2) sell		0	37	4	20	0	61	0.0038009
(3) hold		3	1	204	90	4	302	0.0188174
(4) buy		0	1	21	3003	16	3041	0.1894822
(5) strong buy		1	0	9	47	295	352	0.0219328
total		12	40	238	3165	315	3770	
percentage		0.0007477	0.0024924	0.0148296	0.1972085	0.0196274		100%

Table 11: Matrix for sample without firm event

Several research studies have discussed the herding behavior of analysts and can possibly explain the results found in Tables 9 and 11. According to Welch (2000), security analysts tend to herd by having the same information and therefore coming to the same conclusion. Additionally, according to Welch (2000), most analysts tend to repeat or slightly modify their recommendations rather than depart from the previous recommendation, which is consistent with our research.

After excluding the firm events, the number of recommendations (revisions) decreased from 16049 (670) to 3770 (223) suggesting that analysts tend to piggyback their recommendations and revisions on previous events. Accordingly, the third hypothesis is accepted, that the piggyback theory exists in Chinese stock markets.

5.2 Event Study Results

A total of six event study results will be presented in this section: total sample, sample without firm events, sample without firm events in a bull market, sample without firm events in a bear market, buy group and sell group. The purpose of the first two event studies is to determine whether analysts can produce new information on non-news days throughout the entire period. The following two event studies investigated whether revisions have information content during a bull market or a bear market. The last two event studies follow the methodology of Womack (1996) and prepare for the cross-sectional regression analysis.

Hypothesis 4:

The fourth hypothesis suggests that brokerage analysts' revisions can influence the price in the direction they expected in normal, bull, and bear markets. The hypothesis will be tested by applying the event study to the entire sample, sample without firm events, sample without firm events in a bull market, and sample without firm events in a bear market.

5.2.1 Event study results with whole revisions

In Appendix tables II and III, the average abnormal returns (AAR) for each event day are presented for upgrades and downgrades within the event window (-20,120) with their associated t-statistics, p values, and whether they are significant at 0.05, 0.01 or 0.1 level.

Table 12 presents the partial result of average abnormal returns on each event day over the entire period (-10, 10) for upgrades revisions along with their corresponding t-values, p-values, and whether the average abnormal returns are significant at different significance levels. The significant test is a one-tailed hypothesis test, which tests whether the average abnormal return is greater than zero. As shown in appendix table II, significant positive result was observed in the pre-event window at event days t = -11, -8, -5, -3, -2, -1, 0 before the event date, and in the post-event window at event days t = +36, +44, +54, +66, +69, +81, +117 after the event. It is surprising that average abnormal return at t=-3, -2, -1, 0 is significant at 1% level. It means that there was a significant positive abnormal return before the upgrade revision was issued. Based on this result, the revision may have been leaked if it affected the stock price. Additionally, as shown in Table 10, more than 70% of the revisions are accompanied by firm events and firm events always have a big impact on the stock price (Loh & Stulz, 2011). This study solely focuses on the 50 largest Chinese listed companies and large companies are more likely to leak information than small companies. Therefore, there is no way to tell whether the significant positive pre-event abnormal return is caused by leaks of firm events or revisions.

t	AAR	T	p	star
-10	0.000147	0.167769	0.86705	
-9	0.000385	0.440628	0.660282	
-8	-0.00185	-2.11599	0.03643	**
-7	-0.00141	-1.61367	0.109249	
-6	0.000733	0.838147	0.403629	
-5	0.002314	2.648391	0.009184	***
-4	0.001226	1.403869	0.162962	
-3	0.002573	2.937211	0.003977	***
-2	0.002871	3.283182	0.001348	***
-1	0.005623	6.419189	2.92E-09	***
0	0.005012	5.724319	7.92E-08	***
1	0.000665	0.756871	0.450623	
2	0.000472	0.539868	0.590297	
3	-0.00029	-0.32804	0.743455	
4	-0.00132	-1.51309	0.132908	
5	-0.00042	-0.48107	0.631353	
6	-0.00074	-0.84317	0.400824	
7	-0.00011	-0.12279	0.902478	
8	-0.00011	-0.12579	0.900114	
9	0.000144	0.165381	0.868924	
10	-0.00039	-0.442	0.659289	

Table 12: Partial result for the upgrade revision for the total sample

Table 13 presents the partial results for the average abnormal returns for downgrade revisions over the window (-10, 10), along with the respective t-values and p-values, as well as whether the average abnormal returns are significant at various levels. The hypothesis differs from the upgrade revision, which tested whether average abnormal returns were less than zero. According to the table in appendix III, pre-event results were significantly negative at t = -1, 0, and post-event results were significantly negative at t = +14, +42, +71, +76, +90, +91, +110. Similar to table 12, the average abnormal return at t=-1,0 is significantly negative at the 5% level. This indicates that there was a significant negative abnormal return prior to the downgrade revision. Again, It is possible that the revision has been leaked before it is published. Furthermore, since

this research focuses on the big firms in the FTSE China A50 index, the pre-event negative average abnormal return could be caused by leakage from the firm events. As a result, it is impossible to determine whether leaks of firm events or revisions caused the significantly negative pre-event abnormal return.

t	AAR	T	p	star
-10	-0.00105	-0.7943	0.428599	
-9	-7.8E-05	-0.05932	0.952799	
-8	0.002525	1.913081	0.058141	*
-7	0.000144	0.109117	0.913293	
-6	-0.00171	-1.29444	0.198019	
-5	-0.00016	-0.11942	0.905146	
-4	0.000451	0.335202	0.738063	
-3	0.001202	0.906191	0.366666	
-2	-0.00085	-0.63965	0.523628	
-1	-0.00271	-2.03955	0.043609	**
0	-0.00347	-2.61611	0.010046	**
1	-0.00206	-1.553	0.123078	
2	0.000289	0.218693	0.827264	
3	-0.00067	-0.5056	0.614074	
4	0.000989	0.745366	0.45752	
5	0.00033	0.250451	0.80267	
6	-0.00168	-1.27701	0.204086	
7	0.000711	0.543266	0.587963	
8	0.000417	0.318764	0.750464	
9	0.001857	1.414678	0.159774	
10	0.001426	1.096073	0.27526	

Table 13: Partial result for the downgrade revision for the total sample

Table 14 displays the cumulative average abnormal returns (CAAR) for upgrading revisions as well as corresponding t-values, p-values, and significance level. The hypothesis for the test is whether the cumulative average abnormal returns (CAAR) are larger than zero. It is shown from table 13 that cumulative average abnormal returns were statistically significant at the 0.01 significance level for the two-time intervals t =

-1 to t = +1 and t = -2 to t = +2. However, recall table 12 that the significance of cumulative average abnormal returns (CAAR) during these two intervals is caused by the significance of average abnormal return at t= -2, -1, 0 not t=+1, +2. The cumulative average abnormal return at time intervals from t=-10 to -1 is significantly positive, indicating that buy revisions drifted by 1.26% before the event.

Table 15 presents the results for cumulative average abnormal returns (CAAR) for downgrading revisions. For the two-time intervals t = -1 to t = +1 and t = -2 to t = +2, cumulative average abnormal returns were statistically significant at the 0.01 significance level. However, recall table 13 that the average abnormal return at t= -1, 0 is significant negative, while the average abnormal return at t= +1, +2 is not significant, indicating that the sell revision has a pre-event drift of -0.62%.

Upgrade			
event window	*CAAR*	*T-value*	*P-value*
[-20;20]	0.012224	1.323846	0.188092
[-20;-11]	-0.0027	-0.96631	0.335848
[-10;-1]	0.012611	4.484408	0.000017 ***
[-1;1]	0.011299	7.438768	1.73E-11 ***
[-2;2]	0.014643	7.445539	1.67E-11 ***
[0;10]	0.002922	0.989416	0.324467
[11;20]	-0.00061	-0.21672	0.828802
[21;30]	-0.00243	-0.86779	0.387257
[31;40]	-0.00132	-0.4641	0.643424
[41;50]	-0.00331	-1.17498	0.242349
[51;60]	-0.00112	-0.39483	0.693674
[61;70]	0.005025	1.768619	0.07952 *
[71;80]	-0.00706	-2.47576	0.014702 **
[81;90]	-0.00602	-2.12045	0.036045 **
[91;100]	-0.00494	-1.74	0.084444 *
[101;110]	-0.00037	-0.12924	0.897388
[111;120]	-0.00194	-0.68818	0.492678
[-5;120]	-0.00657	-0.09104	0.927614
[-20;120]	-0.01127	-0.12535	0.900458

Table 14: CAAR results for the upgrade revision in the total sample

downgrade			
event window	*CAAR*	*T-value*	*P-value*
[-20;20]	-0.01137	-0.81774	0.41514
[-20;-11]	-0.0008	-0.19718	0.84402
[-10;-1]	-0.00223	-0.5472	0.585268
[-1;1]	-0.00824	-3.74831	0.000276 ***
[-2;2]	-0.0088	-3.10091	0.002409 ***
[0;10]	-0.00186	-0.43569	0.663851
[11;20]	-0.00649	-1.59653	0.113024
[21;30]	-0.0045	-1.11655	0.266434
[31;40]	0.002341	0.573998	0.567053
[41;50]	-0.00397	-0.96881	0.334605
[51;60]	0.001029	0.250761	0.802432
[61;70]	0.002906	0.713326	0.477041
[71;80]	-0.00702	-1.72463	0.087191 *
[81;90]	-0.00142	-0.34381	0.731597
[91;100]	-0.00261	-0.63276	0.528104
[101;110]	0.004066	0.975845	0.331121
[111;120]	0.000245	0.058024	0.953827
[-5;120]	-0.01934	-0.17572	0.86081
[-20;120]	-0.00014	-0.15649	0.924512

Table 15: CAAR results for the downgrade revision in the total sample

Overall, the result indicates a significant drift for both recommendations upgraded and downgraded prior to events. Comparatively, the post-event drift is almost nonexistent. Since this study focuses on the top 50 Chinese listed firms, where big firms are likely to leak information, it is unclear whether this pre-event drift is caused by the leakage of revisions or firm events. Therefore, the next event study focuses only on revisions without firm events.

5.2.2 Event study results without firm events

In the appendix, tables IV and V depict average abnormal returns (AAR) for upgrade and downgrade revisions without firm events over the sample period, as well as their respective t-value, p-value, and significance level.

Table 16 shows partial results of the average abnormal returns for upgrades without firm events. According to the table IV in the appendix ,It was found that significant positive results were observed in the pre-event window at event days t = -11, -5, -3, -1, 0, and in the post-event window at event days t = +31, +39, +54, +87, +117 after the event. In accordance with the results in table 12, the average abnormal return at t=-5, -3, -1, 0 is still significant at the 1% level, indicating that there were significant positive abnormal returns prior to the upgrade revision. It suggested that upgraded revisions are valuable and revision has been leaked. An upgrade revision at t=-1 has an economic impact of 0.5%, which decreases to 0.4% at the announcement date. Additionally, the economic impact of the firm events related to the upgrade revision is only 0.06% (exp (0.005623)-exp (0.004991)) at t=-1, and this number increases to 0.08% at the time of the announcement of the upgrade revision. Consequently, even on a non-news day, the upgrade revision contains additional information.

t	AAR	T	p	star
-10	0.000386	0.272399	0.785787	
-9	9.42E-05	0.066322	0.947233	
-8	-0.00252	-1.77591	0.078304	*
-7	0.00052	0.367696	0.713753	
-6	0.001051	0.738755	0.46151	
-5	0.004878	3.438519	0.000807	***
-4	0.001472	1.039989	0.300454	
-3	0.004279	3.016965	0.003123	***
-2	0.001237	0.874152	0.383796	
-1	0.004991	3.518337	0.000616	***
0	0.004156	2.936508	0.003986	***
1	6.94E-05	0.048967	0.961028	
2	-0.00071	-0.50145	0.616978	
3	-0.00107	-0.75844	0.449685	
4	-0.00274	-1.9289	0.056124	*
5	0.000333	0.235501	0.814225	
6	-0.0013	-0.91803	0.360458	
7	0.000438	0.309249	0.757673	
8	0.001976	1.397237	0.164942	
9	-0.00123	-0.86705	0.38766	
10	0.001331	0.941653	0.348278	

Table 16: partial result for the upgrade revision for events without firm events

Table 17 presents partial results for the average abnormal returns for downgrades without firm events. According to table V in the appendix, statistically significant negative results were found at event days t = +13, +14, +21, +29, +42, +55, +59, +76, +84, +89, +96 after the event. At t=-1, -2, the average abnormal return is negative, but not significant, indicating that some investors get the information in advance and choose to sell, but not the majority did. As opposed to table 13, there were no average abnormal returns in the pre-event and post-event periods, indicating that the -0.62% abnormal return at t=-1,0 in table 13 is the result of firm events and downgrade revisions are not valuable. This may be due to the restriction on short selling in the Chinese market. It means downgrade revisions are not profitable for investors who do not own

stocks. Additionally, since this research focuses exclusively on big companies, the dominant investors are the institutional investors, who are mostly long-term investors, and it will not be easy to sell the stocks as explained in the background.

Additionally, the result in table 16 suggests that the revisions have been leaked, the leak of downgrade revision does not cause any abnormal return indicating that institutional investors are more sensitive to the firm events than downgrade recommendation revisions. These investors place a greater emphasis on the financial report than on the research report.

t	AAR	T	p	star
-10	-0.00266	-1.21313	0.227484	
-9	-0.00115	-0.52719	0.59904	
-8	0.000616	0.282892	0.777752	
-7	-0.00031	-0.14335	0.886256	
-6	-0.00164	-0.75232	0.453342	
-5	0.001503	0.649971	0.516964	
-4	0.000481	0.208902	0.834882	
-3	0.003654	1.638643	0.103929	
-2	-0.00191	-0.85276	0.395504	
-1	-0.00218	-0.98328	0.327462	
0	0.004227	1.905586	0.059117	*
1	-0.00058	-0.26065	0.794809	
2	0.000319	0.145384	0.884654	
3	0.001591	0.720237	0.472791	
4	-5.1E-05	-0.02262	0.981991	
5	-0.00169	-0.77709	0.43865	
6	-0.00091	-0.42203	0.673766	
7	0.000922	0.429521	0.668321	
8	0.001042	0.486217	0.627707	
9	0.00514	2.396565	0.018107	**
10	0.005131	2.457096	0.015449	**

Table 17: Partial result for the downgrade revision for events without firm events

Table 18 presents the cumulative average abnormal returns (CAAR) for upgrading revisions without firm events, along with the corresponding t-values, p-values, and significance level. The cumulative average abnormal returns of t = -1 to t = +1 and t = -2 to t = +2 are statistically significant at 0.01 significance level. As can be seen in Table 16, the significance of cumulative average abnormal returns (CAAR) during these two intervals stems from the significant average abnormal return during t=-1,0 rather than t=+1, +2. The cumulative average abnormal return at time intervals from t=-10 to -1 is significantly positive, indicating that buy revisions drifted by 1.64% before the event.

Upgrade			
event window	*CAAR*	*T-value*	*P-value*
[-20;20]	0.017231	1.0869	0.279278
[-20;-11]	-0.00165	-0.36188	0.718081
[-10;-1]	0.016388	3.563876	0.000527 ***
[-1;1]	0.009216	3.739619	0.000285 ***
[-2;2]	0.009742	3.04945	0.002826 ***
[0;10]	0.001252	0.261639	0.794052
[11;20]	0.001245	0.273373	0.78504
[21;30]	-0.00377	-0.82936	0.408561
[31;40]	0.006179	1.340446	0.182654
[41;50]	-0.0042	-0.91816	0.360391
[51;60]	-0.0031	-0.67561	0.500602
[61;70]	-0.0009	-0.1972	0.844008
[71;80]	0.002967	0.640279	0.523222
[81;90]	-0.00286	-0.61817	0.537642
[91;100]	-0.00354	-0.76093	0.448201
[101;110]	-8E-05	-0.0175	0.986067
[111;120]	-0.00688	-1.49064	0.138702
[-5;120]	0.003178	0.02552	0.979683
[-20;120]	0.001056	0.006794	0.994591

Table 18: CAAR results for the upgrade revision for events without firm events

Table 19 presents the results for cumulative average abnormal returns (CAAR) for downgrading revisions. For the two-time intervals t = -1 to t = +1 and t = -2 to t = +2, cumulative average abnormal returns were not statistically significant. Additionally, there was no pre-event drift observed. It suggests that the downgrade revision does not have any investment value.

downgrade			
event window	*CAAR*	*T-value*	*P-value*
[-20;20]	0.014955	0.757412	0.450301
[-20;-11]	0.009638	1.621082	0.107647
[-10;-1]	-0.0036	-0.60939	0.543426
[-1;1]	0.001462	0.456237	0.649051
[-2;2]	-0.00013	-0.03128	0.975097
[0;10]	0.015133	2.415024	0.017256 **
[11;20]	-0.00621	-1.05114	0.295323
[21;30]	-0.0114	-1.93319	0.055588 *
[31;40]	0.000179	0.030278	0.975896
[41;50]	-0.00659	-1.10383	0.271892
[51;60]	-0.00679	-1.13893	0.257019
[61;70]	0.004792	0.804366	0.42279
[71;80]	-0.00044	-0.07347	0.941553
[81;90]	-0.0016	-0.26827	0.788955
[91;100]	-0.00381	-0.63336	0.527715
[101;110]	-0.00131	-0.21969	0.826489
[111;120]	-0.00452	-0.74952	0.455024
[-5;120]	-0.02102	-0.13853	0.890059
[-20;120]	-0.01653	-0.08732	0.930561

Table 19: CAAR results for the downgrade revision for events without firm events

Overall, after excluding revisions with firm events, an upgraded revision contains

information, while a downgraded revision does not contain information. In line with Jiang, Lu & Zhu (2014), Chinese stock markets are more sensitive to upgrade revisions than downgrade revisions. The limited number of short sales and sample targets may account for this. Specifically, the Chinese stock market has a high threshold for short selling, so downgrade revisions are not profitable for most investors who do not own stocks. Additionally, only big companies are examined in this study, and the stock prices of these big companies are dominated by institutional investors, who are long-term investors and emphasize the financial report rather than the research report. In this case, institutional investors will not be able to sell the shares easily.

Although the upgraded revision is valuable, most of the abnormal returns were found prior to the announcement of the revision. In this case, investors who are unable to obtain information in advance do not benefit from these revisions. For the investors who can get information in advance, an upgrade revision can provide an average abnormal return of 1.64% if the investor receives the information 10 days before the announcement.

This result might explain why almost 99% of the individual investors lost money in the Chinese stock market. There are always institutional investors who have access to information in advance and buy stocks in advance to generate a profit, whereas individual investors do not have access to the information until the announcement date and are unable to earn abnormal returns.

5.2.3 Results of the event study without firm events during the bull market

In the appendix, VI and VII show the average abnormal returns (AARs) for upgrading and downgrading revisions made without firm events during the bull market, along with their respective t-values, p-values, and significance levels.

Table 20 illustrates the partial result for average abnormal returns during the bull market for upgrades without firm events. On the basis of table VI in appendix, the significant positive results were observed in the pre-event window at event days t = -4, -3, -2, -1, 0, and in the post-event window at event days t = +9, +11, +14, +33, +35, +47, +57, +60, +64, +72, +73, +81, +83, +84, +93, +94, +99, +102, +108, +109, +110, +118, +119. The results are consistent with those in table 16 that the revisions have already leaked. In addition, the average abnormal return in the bull market is significantly larger than the average abnormal return in the total sample without firm events. Specifically, there was an increase in average abnormal returns at t=-3, -2, -1, 0 from 0.42%, 0.12%, 0.5%, 0.42% to 1.02%, 1.36%, 0.85%, 1.3% in the bull market. Consequently, in the bull market, investors will gain more value by knowing the upgrade revision in advance. Investors who do not have access to information in advance and follow the trades with revisions cannot earn abnormal returns.

t	AAR	T	p	star
-10	0.003032	0.745393	0.457504	
-9	0.00653	1.607826	0.110523	
-8	0.004537	1.117266	0.266131	
-7	-0.00425	-1.0452	0.298048	
-6	-0.00202	-0.49767	0.619633	
-5	-0.00054	-0.13271	0.894645	
-4	0.009617	2.367275	0.019533	**
-3	0.010191	2.509276	0.013443	**
-2	0.013576	3.341853	0.001113	***
-1	0.008531	2.09956	0.037881	**
0	0.013069	3.212786	0.001692	***
1	0.002587	0.636051	0.525965	
2	0.000853	0.210036	0.833999	
3	-0.00734	-1.80664	0.073346	*
4	-0.00816	-2.00893	0.046808	**
5	0.002269	0.558745	0.577385	
6	-0.00025	-0.06102	0.95145	
7	0.00292	0.718199	0.474042	
8	0.005725	1.409159	0.161396	
9	0.014865	3.656448	0.000382	***
10	-0.00367	-0.90168	0.369046	

Table 20: Partial result for the upgrade revision in the bull market

Table 21 shows a partial result of the average abnormal returns for downgrades without firm events in a bull market. In table VII of the appendix, statistically significant negative results were found at event days t = -14, -6, +12, +21, +22, +29, +36, +38, +48, +52, +84, +89, +91, +92, +94. Although the average abnormal returns at t=+1 and -1 are negative, they are not significant. The pre-event and post-event periods did not show any significant negative abnormal returns, indicating that downgrade revisions are of no value to investors in the bull market.

t	AAR	T	p	star
-10	-0.00638	-0.99102	0.323686	
-9	0.003165	0.489641	0.62529	
-8	0.011924	1.85537	0.066018	*
-7	-0.00545	-0.84654	0.398953	
-6	-0.01379	-2.12772	0.035424	**
-5	-0.00103	-0.15827	0.874513	
-4	0.009911	1.524426	0.130056	
-3	0.017887	2.771271	0.006482	***
-2	0.003942	0.611526	0.542018	
-1	0.006073	0.940462	0.348886	
0	-0.0051	-0.78642	0.433187	
1	-0.00718	-1.11544	0.266908	
2	0.003216	0.4997	0.618209	
3	-0.00485	-0.75193	0.45358	
4	0.000541	0.081913	0.934854	
5	-0.00337	-0.52073	0.603523	
6	0.013327	2.059962	0.041583	**
7	0.001846	0.282867	0.77777	
8	0.002805	0.433381	0.665523	
9	0.018509	2.827541	0.005505	***
10	0.026941	4.184124	5.51E-05	***

Table 21: Partial result for the downgrade revision in the bull market

Table 22 presents the cumulative average abnormal returns (CAAR) for upgrading revisions in the bull market without firm events. Similarly, the cumulative average abnormal returns of t = -1 to t = +1 and t = -2 to t = +2 are statistically significant at 0.01 significance level and it is due to the significant AAR at t=-1.0. The cumulative average abnormal return at time intervals from t=-10 to -1 is significantly positive, while the magnitude increases from 1.64% to 4.92%, which implies a 4.92% drift in buy revisions 10 days before revision announcement. People who receive the upgrade revision 10 days prior to the announcement date are likely to earn an abnormal return of more than 4.92%. Furthermore, the results do not reveal any post-event drift, indicating that investors who are incapable of obtaining the information in advance and

following the revision cannot earn abnormal returns in the bull market.

Upgrade			
event window	*CAAR*	*T-value*	*P-value*
[-20;20]	0.087467	2.690454	0.008162 ***
[-20;-11]	0.006486	0.475995	0.634951
[-10;-1]	0.049207	3.613345	0.000444 ***
[-1;1]	0.024187	3.253774	0.001483 ***
[-2;2]	0.038616	4.022668	0.000102 ***
[0;10]	0.022879	1.603383	0.111501
[11;20]	0.008895	0.65179	0.515794
[21;30]	0.006184	0.453354	0.651119
[31;40]	-0.00771	-0.56622	0.57231
[41;50]	0.006649	0.487923	0.626502
[51;60]	0.012062	0.886239	0.377276
[61;70]	0.001652	0.121344	0.903623
[71;80]	0.004576	0.336129	0.737365
[81;90]	0.010729	0.788997	0.431683
[91;100]	0.036514	2.677015	0.008477 ***
[101;110]	0.067457	4.937328	2.61E-06 ***
[111;120]	0.002133	0.156564	0.875854
[-5;120]	0.213396	1.269616	0.206699
[-20;120]	0.227713	1.096573	0.275042

Table 22: CAAR results for the upgrade revision in the bull market

Table 23 presents the results for cumulative average abnormal returns (CAAR) for downgrading revisions. No statistically significant negative abnormal returns were found around the announcement date of the downgrade revision. However, statistically positive abnormal returns were observed in the event window (0, 10). According to table 21, the average abnormal return shows a significant positive value at t=+6, +9, +10. This means that investors who believe the downgrade revision and choose to sell

the stocks immediately will suffer an average loss of 4.7% in ten days. Therefore, the downgrade revisions revision has no investment value in the bull market.

downgrade			
event window	*CAAR*	*T-value*	*P-value*
[-20;20]	0.03563	0.330556	0.741561
[-20;-11]	-0.01381	-0.62816	0.531103
[-10;-1]	0.02626	1.191884	0.235678
[-1;1]	-0.00621	-0.52809	0.59842
[-2;2]	0.000951	0.062707	0.950105
[0;10]	0.046691	1.952317	0.053249 *
[11;20]	-0.02352	-1.06732	0.287989
[21;30]	-0.03022	-1.38012	0.170137
[31;40]	-0.06027	-2.79298	0.006088 ***
[41;50]	-0.00759	-0.33336	0.739449
[51;60]	-0.0208	-0.90358	0.368044
[61;70]	0.056707	2.499754	0.01379 **
[71;80]	-0.00169	-0.07449	0.940744
[81;90]	0.019016	0.83194	0.407109
[91;100]	-0.04743	-1.98445	0.049507 **
[101;110]	0.03085	1.322241	0.188624
[111;120]	0.027723	1.197304	0.233568
[-5;120]	0.026251	0.027233	0.97832
[-20;120]	0.001919	0.001596	0.998729

Table 23: CAAR results for the downgrade revision in the bull market

As a result, upgrading revisions are more valuable in a bull market than in a normal market. Comparatively, downgrade revisions are not considered valuable. However, these values are only available to those investors who can obtain the revision in advance. Economically, an abnormal return of 4.92% can be earned by investors who receive the upgrade revision 10 days before the announcement. For downgrade revisions, investors

will lose an average of 4.7% if they follow the revision during the event window (0, 10).

5.2.4 Results of the event study without firm events during the bear market

Tables VII and VIII provide average abnormal return (AAR) data for upgrades and downgrades made without firm events during the bear market, along with p-values, t-values, and significance levels.

Table 24 presents the partial result of the average abnormal return for upgrade revisions without firm events during the bear market. Significant positive results were observed only at t=+36, +37, +45, +54, +87 and +105 according to the table in appendix VII. Although the average abnormal return at t=-2, -1, 0, +1 is positive, the result is not significant. Accordingly, upgrade revisions in bear markets do not have investment value because there are no abnormal returns around the announcement date. This result is not surprising. It appears from Table 5 that the percentage of the strong buy increases from 10% in the normal market to over 21% in the bear market. This insignificant result may be attributed to these non-skilled analysts.

t	AAR	T	p	star
-10	0.007703	1.275645	0.204565	
-9	0.003355	0.551235	0.582506	
-8	-0.00917	-1.51105	0.133427	
-7	-0.00864	-1.44158	0.152046	
-6	0.0092	1.520631	0.131005	
-5	0.006274	1.038446	0.301168	
-4	0.000881	0.147047	0.883344	
-3	0.000993	0.164197	0.869855	
-2	5.91E-05	0.009867	0.992144	
-1	0.004768	0.789684	0.431283	
0	0.000482	0.080391	0.936061	
1	0.004348	0.724511	0.470174	
2	-0.00993	-1.6541	0.100742	
3	-0.0086	-1.42802	0.155906	
4	-0.00939	-1.55835	0.121806	
5	-0.00456	-0.75897	0.449368	
6	-0.00023	-0.03782	0.969895	
7	0.002278	0.379557	0.704951	
8	0.002179	0.364476	0.71615	
9	-0.00262	-0.43684	0.663023	
10	-0.00085	-0.14286	0.886645	

Table 24: Partial result for the upgrade revision in the bear market

Table 25 shows the average abnormal returns for downgrades without firm events in the bear market. Statistically significant negative results were found at event days t = +11, +13 based on the table VIII in the appendix. Also, the average abnormal return at t=+1 is negative, but it is not significant. Due to the lack of abnormal returns around the downgrade announcements, downgrade revisions in bear markets have no investment value.

t	AAR	T	p	star
-10	-0.00471	-0.174	0.86216	
-9	-0.0063	-0.23732	0.812813	
-8	-0.00761	-0.28666	0.774872	
-7	-0.00328	-0.124	0.901526	
-6	0.00446	0.16679	0.867818	
-5	0.005825	0.189308	0.850174	
-4	0.007446	0.24494	0.806925	
-3	-0.00808	-0.28715	0.774497	
-2	0.003682	0.129182	0.897432	
-1	0.002636	0.094545	0.924835	
0	0.00323	0.116651	0.907333	
1	-0.00962	-0.33986	0.734562	
2	0.010351	0.382914	0.702466	
3	-0.00257	-0.09384	0.925393	
4	0.003241	0.113762	0.909618	
5	-0.00998	-0.37483	0.708451	
6	-0.00296	-0.11466	0.908904	
7	-0.00531	-0.20905	0.834769	
8	-0.00258	-0.10199	0.918936	
9	0.004092	0.161533	0.871948	
10	-0.00605	-0.25701	0.797616	

Table 25: Partial result for the downgrade revision in the bear market

Table 26 presents the cumulative average abnormal returns (CAAR) for upgrading revisions in the bear market without firm events. CAARs on event windows (-10, -1) and (-1,1) are positive but not significant. There are only positive statistically significant abnormal returns between (31,40) and (81,90). Moreover, a negative value in event windows (0, 10), (11, 20) and (21, 30) indicates that there has been a negative abnormal return following the announcement of the upgrade revision. As a result, upgrade revisions in the bear market do not have investment value due to the lack of drift in the post-event and pre-event windows.

Upgrade			
event window	CAAR	T-value	P-value
[-20;20]	-0.04823	-0.47595	0.63498
[-20;-11]	-0.02084	-1.0149	0.312214
[-10;-1]	0.015428	0.731735	0.465769
[-1;1]	0.009598	0.886849	0.376949
[-2;2]	-0.00028	-0.01961	0.984385
[0;10]	-0.0269	-1.26013	0.210088
[11;20]	-0.01591	-0.78318	0.435078
[21;30]	-0.01346	-0.6638	0.508103
[31;40]	0.047723	2.238588	0.027042 **
[41;50]	-0.02699	-1.31014	0.192673
[51;60]	-0.01895	-0.91353	0.362809
[61;70]	-0.00815	-0.40024	0.689694
[71;80]	-0.01619	-0.74542	0.457487
[81;90]	0.050858	2.374646	0.019165 **
[91;100]	0.001854	0.086613	0.931124
[101;110]	0.009001	0.430504	0.667608
[111;120]	-0.01072	-0.5066	0.613374
[-5;120]	-0.01487	-0.01658	0.986798
[-20;120]	-0.03325	-0.02967	0.976382

Table 26: CAAR results for the upgrade revision in the bear market

Table 27 presents the results for cumulative average abnormal returns (CAAR) for downgrading revisions. The cumulative average abnormal returns are only statistically significant at the time interval of (11, 20). Although the CAAR values in event windows (-10, -1) and (0, 10) are negative, they are not significant. Therefore, there were no statistically significant negative abnormal returns around the announcement of the downgrade revision, suggesting that the downgrade revision has no investment value in the bear market.

downgrade			
event window	CAAR	T-value	P-value
[-20;20]	-0.15076	-1.4352	0.153854
[-20;-11]	0.003922	0.086117	0.931518
[-10;-1]	-0.00594	-0.13095	0.896034
[-1;1]	-0.00376	-0.15154	0.879804
[-2;2]	0.010277	0.320999	0.748774
[0;10]	-0.01817	-0.38049	0.704258
[11;20]	-0.13057	-2.87381	0.004805 ***
[21;30]	-0.03137	-0.69316	0.48956
[31;40]	0.04778	1.048393	0.296582
[41;50]	-0.06956	-1.53485	0.127475
[51;60]	-0.0233	-0.51448	0.607874
[61;70]	-0.01045	-0.23063	0.818002
[71;80]	-0.06311	-1.38838	0.167616
[81;90]	-0.05295	-1.16717	0.245477
[91;100]	0.015416	0.339014	0.735197
[101;110]	-0.01951	-0.42991	0.668041
[111;120]	-0.03601	-0.7957	0.427791
[-5;120]	-0.38031	-0.81905	0.414393
[-20;120]	-0.39383	-0.68771	0.492971

Table 27: CAAR results for the downgrade revision in the bear market

Overall, neither an upgrade nor a downgrade revision in a bear market is associated with statistically significant abnormal returns, which suggests that revisions in a bear market have no investment value. Therefore, revisions are not beneficial to investors regardless of whether they receive advance information.

Accordingly, a few findings can be drawn from this four event study. It is firstly important to note that brokerage analyst revisions have been leaked, which means that

some investors have already obtained the revision before it is officially announced. In addition, downgrade revisions are not valuable for all investors due to the limitations of short selling in Chinese markets and sample selection in this study. In regard to the upgrade revisions, those investors who do not have access to the information in advance cannot earn a profit in any market by following the revision. For investors who obtain the information in advance can only earn an abnormal return in a normal and bull market. Specifically, when investors receive the upgrade revision 10 days before the announcement, they can earn 1.64% cumulative average abnormal returns. This number increases from 1.64% to 4.92% in a bull market. Comparatively, in the bear market, the brokerage analysts' revisions do not have any investment value for all investors.

Therefore, the fourth hypothesis indicates that brokerage analysts' revisions containing information about different types of markets are partially accepted. There is information contained in the brokerage analysts' upgrade revisions for both bullish and normal markets. In contrast, brokerage analysts' downgrade revisions do not contain any information across all different markets.

5.2.5 Event study results for buy and sell group used for the regression

Regression analysis will be conducted using the results of the event study in this part. The content of this part will be like that of Womack (1996). The buy group indicates that the rating has been changed from hold, sell, or strong sell to buy or strong buy. The sell group indicates that the rating has been revised from hold, buy and strong buy to sell and strong sell. It is important to note that buy group differs from previous upgraded revisions in that buy group does not include recommendations which change from

strong sell to sell, strong sell and sell to hold, and buy to strong buy. While the sell groups exclude the recommendation that changes from strong buy to buy and sell to strong sell.

Tables IX and X provide average abnormal return (AAR) data for buy group and sell group made without firm events, along with p-values, t-values, and significance levels.

Table 28 shows partial results for average abnormal returns for buy groups without firm events. According to the table IX in the appendix, strong positive results were observed in the pre-event window at event days -11, -7, -5, -3, -2,-1, 0, and in the post-event window at event days +11, +31, +33, +35, +36, +72, +73, +79, +117 following the event. In accordance with the previous result, the average abnormal return at t=-5, -3, -1, 0 is still significant at the 1% level, suggesting significant abnormal returns existed prior to the announcement date for the buy group. The magnitude of the average abnormal return in the pre-event window is higher than the average for the entire period but lower than the average for the bull market. Specifically, there was an increase in average abnormal returns at t=-5 -3, -1, 0 from 0.49%, 0.43%, 0.5%, 0.42% across the period to 0.59%, 0.47%, 0.58%, 0.42% in the buy group.

t	AAR	T	p	star
-10	0.000861	0.599582	0.549925	
-9	0.000137	0.095733	0.923894	
-8	-0.00248	-1.7305	0.086134	*
-7	0.002505	1.749162	0.082841	*
-6	0.000462	0.320946	0.748815	
-5	0.005936	4.132404	6.71E-05	***
-4	0.000262	0.182769	0.85529	
-3	0.00468	3.262463	0.001442	***
-2	0.002968	2.06889	0.040722	**
-1	0.00582	4.052382	9.08E-05	***
0	0.004247	2.96414	0.003667	***
1	0.000609	0.423837	0.67245	
2	-0.0004	-0.2807	0.779431	
3	-0.00073	-0.50783	0.612512	
4	-0.00287	-1.99657	0.048154	**
5	-0.00106	-0.73798	0.461982	
6	-0.0023	-1.606	0.110924	
7	0.000791	0.551638	0.582231	
8	0.001828	1.275334	0.204675	
9	-0.00135	-0.94183	0.348188	
10	0.00095	0.663292	0.508427	

Table 28: Partial result for the buy group

Table 29 shows partial results for average abnormal returns for sell groups without firm events. In the appendix, table X shows that strong negative results were observed during the pre-event window at t=-10 and during the post-event window at t=+13, +14, +21, +22, and +23 following the event. In line with the previous result, the downgrade revisions in the sell groups do not have any investment value since no significant negative value has been detected around the announcement date. However, there is a small difference between the magnitude of the sell group and the previous event study. There are negative abnormal returns at t=-4, -3, -2, -1, which previous event studies did not have. Also, the p-value of t=-2 is 0.119, which is close to 0.1. The change of the

magnitude and p-value indicates that in some cases, the downgrade revisions might be valuable for the investors who can obtain the information in advance.

t	AAR	T	p	star
-10	-0.00622	-2.14818	0.033727	**
-9	-0.00172	-0.58978	0.556458	
-8	0.002259	0.780565	0.436609	
-7	0.000627	0.216225	0.829182	
-6	-0.00276	-0.94684	0.345641	
-5	0.005157	1.773324	0.078733	*
-4	-0.00119	-0.40892	0.683334	
-3	-0.00017	-0.05959	0.952584	
-2	-0.00456	-1.57068	0.118913	
-1	-0.00317	-1.09112	0.277425	
0	0.010978	3.764087	0.000261	***
1	0.0024	0.827654	0.409523	
2	0.002346	0.810757	0.419124	
3	-0.00017	-0.05834	0.953578	
4	-0.00031	-0.10703	0.914949	
5	0.000778	0.268027	0.789142	
6	-0.00071	-0.24295	0.808466	
7	-0.00068	-0.23336	0.81588	
8	0.003782	1.301941	0.195451	
9	0.008457	2.896656	0.00449	***
10	0.008152	2.81042	0.005787	***

Table 29: Partial result for the sell group

Table 30 presents the cumulative average abnormal returns (CAAR) for buy groups, along with the corresponding t-values, p-values, and significance level. In the event window (-10, -1), (-, 1, 1) and (-2,2), cumulative abnormal returns were statistically

significant at 0.01 significance level. Table 28 shows that the significance of cumulative average abnormal returns (CAAR) during these intervals is largely due to the significant average abnormal returns during the pre-event. Additionally, the pre-event drift increases from 1.64% to 2.1%. This indicates that investors who receive advance information 10 days before the announcement date can expect to earn an abnormal return of 2.1% on average. Furthermore, the negative abnormal return in the post-event window (0,10) indicates that investors following the revision will experience a loss of capital.

Buy group			
event window	*CAAR*	*T-value*	*P-value*
[-20;20]	0.021217	1.412055	0.160544
[-20;-11]	-0.00136	-0.29541	0.768195
[-10;-1]	0.021152	4.560464	1.25E-05 ***
[-1;1]	0.010676	4.284888	3.73E-05 ***
[-2;2]	0.01324	4.093644	7.77E-05 ***
[0;10]	-0.00028	-0.05852	0.953429
[11;20]	0.001703	0.369777	0.712206
[21;30]	-0.00173	-0.37667	0.707092
[31;40]	0.013217	2.826968	0.005514 ***
[41;50]	-0.00457	-0.99356	0.322451
[51;60]	-0.00406	-0.87849	0.381447
[61;70]	-0.00532	-1.16243	0.247387
[71;80]	0.007356	1.586388	0.115305
[81;90]	-0.00841	-1.81446	0.072126 *
[91;100]	-0.00053	-0.11181	0.911164
[101;110]	-0.00366	-0.79988	0.425374
[111;120]	-0.00576	-1.23446	0.219464
[-5;120]	0.007623	0.067329	0.946433
[-20;120]	0.007753	0.054881	0.956325

Table 30: CAAR results for the buy group

Table 31 presents the results for cumulative average abnormal returns (CAAR) for sell groups. Cumulative average abnormal returns are statistically significant at the 1% level for the interval t = 0 to t = +10. It indicates that a positive abnormal return occurs following the announcement of the downgrade revision. Besides the event window (-10, -1), there are no negative numbers found around the announcement of the downgrade revision; therefore, the downgrade revision in sell groups has no investment value.

Sell group			
event window	*CAAR*	*T-value*	*P-value*
[-20;20]	0.025566	0.729385	0.467199
[-20;-11]	0.012386	1.307127	0.19369
[-10;-1]	-0.01175	-1.24553	0.215385
[-1;1]	0.010211	2.006459	0.047075 **
[-2;2]	0.007993	1.215574	0.226553
[0;10]	0.035024	3.489269	0.00068 ***
[11;20]	-0.0101	-1.07477	0.284653
[21;30]	-0.0222	-2.35434	0.020194 **
[31;40]	-0.00622	-0.66524	0.507185
[41;50]	-0.00272	-0.286	0.775375
[51;60]	0.001151	0.120045	0.90465
[61;70]	0.013983	1.463022	0.146098
[71;80]	0.008133	0.85374	0.394965
[81;90]	0.003406	0.358656	0.720488
[91;100]	-0.00434	-0.4437	0.658063
[101;110]	-0.01023	-1.0707	0.286472
[111;120]	0.010209	1.047624	0.296935
[-5;120]	0.012162	0.042345	0.966295
[-20;120]	0.016739	0.046698	0.962832

Table 31: CAAR results for the sell group

Figures 4 and 5 plot the cumulative average abnormal return (CAAR) for the buy group and sell group over the event window (-10, 10).

Figure 4 plots the CAAR graph for the buy group. It can be observed that abnormal returns continue to increase during the pre-event window (-8,0) and decrease immediately following the announcement date. The result indicates that there is a positive abnormal return before the announcement of the revision, but the abnormal return begins to decrease after the revision has been issued. Therefore, these results are in contrast to Womack (1996) which suggests that the CAR graph for the buy group is moving in a positive direction in the post-event window.

Thus, the graph suggests that investors are not unable to earn abnormal returns by following the upgrade revision. only those investors who can obtain information in advance can earn abnormal returns in the Chinese stock market,

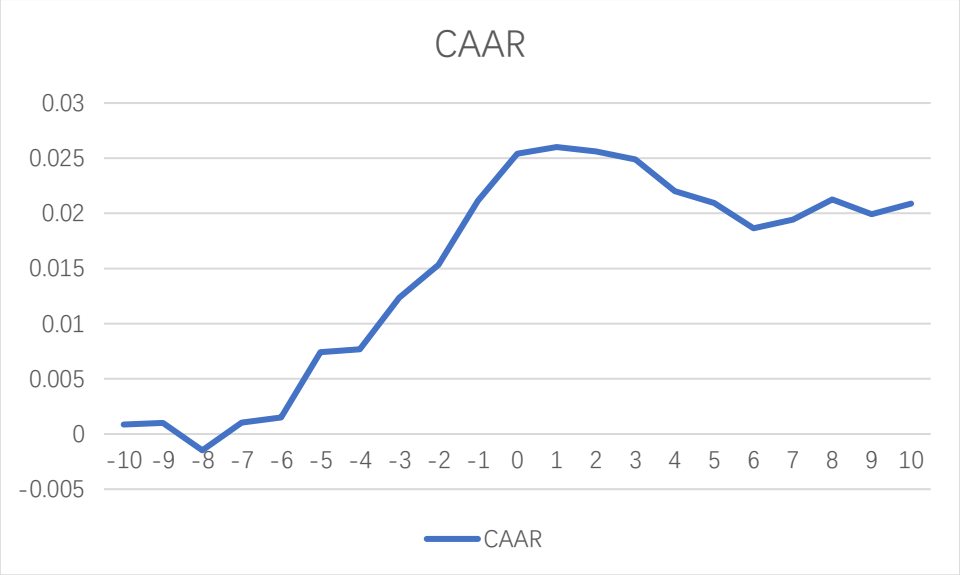

Figure 4: CAAR of buy group

Figure 5 plots the CAAR graph for the sell group. During the pre-event window (-4,-1) abnormal returns continue to decrease and increase immediately after t=-1. It appears that abnormal returns are negative before the announcement of revision but begin to increase around the announcement date. Accordingly, these results contradict Womack (1996), who found that the post-event CAR graph for the sell group was moving in a negative direction.

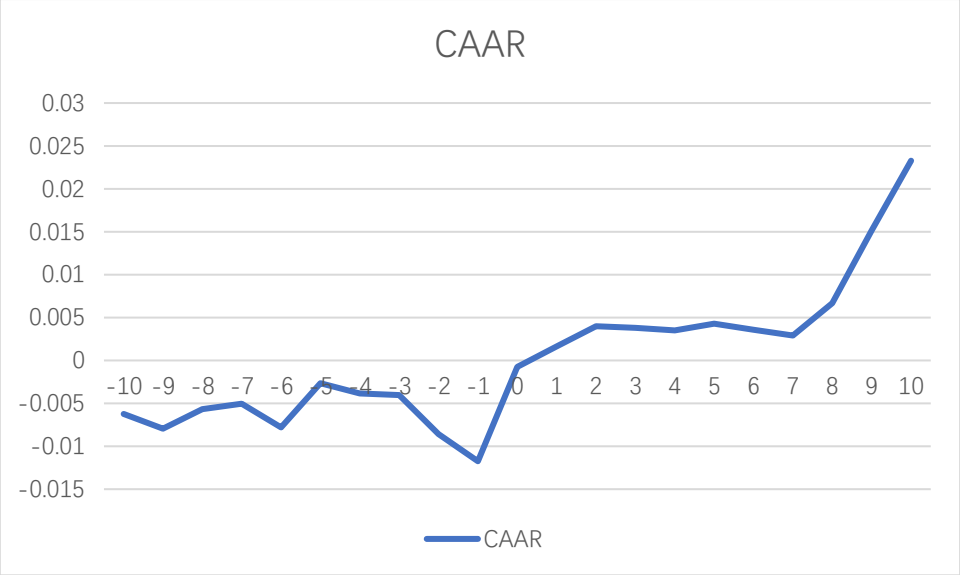

Figure 5: CAAR of sell group

Overall, the results in the buy group and sell group are in line with the results in the total sample without firm events; upgrades are valuable, while downgrades are not.

5.3 Regression Analysis

Results of the regression analysis will be presented in this section. Importantly, the regression only includes revisions without firm events. The buy group indicates that the rating has been revised from hold, sell, or strong sell to buy and strong buy. Those who have been rated from a strong buy, a buy or a hold rating to a sell or a strong sell rating fall under the Sell group.

The buy group and sell group will be regressed separately by using the following multivariate cross-sectional regression equation. The dependent variable in this

regression equation is the cumulative abnormal return of the buy/sell group during the window (t, T). Independent variables include the number of analysts, brokerages, the strength of the revision, whether the revision skips a rank, and the corresponding market type for the revision.

$$CAR_{t,T} = \alpha + \beta_1 Analyst + \beta_2 Brokerage + \beta_3 Discovery + \beta_4 Skip + \beta_5 Type + \in$$

Definitions of independent variables:

The variable ANALYST indicates the number of analysts for each firm in the sample period. The variable BROKERAGE refers to the number of brokerage firms covered by a specific firm. DISCOVERY takes the value one if an upgrade revision changes the recommendation to a strong buy and a downgrade revision changes it to a strong sell. The SKIP value is one if at least a rank was skipped (eg. From sell to buy), and zero otherwise. TYPE takes the value one if the upgrade revisions are announced in the bull market and downgrade revisions are announced in the bear market.

A variety of event windows are included in this study, including [-10, -1], [-1, 1], [-3, 3], [-5, 5], [0, 10] and [-20, 120], where each event window has a different meaning. Information content in the short window [-1, 1], [-3, 3] and [-5, 5] reflects the performance of the revisions over the short term, whereas information content in the long window [-20, 120] reflects the performance of the revisions over the long term. Pre-event dissemination is captured by the period [-10, -1] since event study results indicate that revisions have been leaked already. Post-event performance is captured with the post-event window [0, 10]. Using different event windows is an attempt to determine whether the results are valid at different times.

Table 32 provides descriptive statistics regarding the cumulative abnormal returns (CAR) for both the buy and sell groups. With respect to the buy groups, the means of Cumulative abnormal returns (CAR) are positive and statistically significant at the 1% level at the event window [-10, -1], [-1, 1], [-3, 3], [-5, 5], whereas the cumulative abnormal returns at event window [0, 10] and [-20, 120] are not statistically significant. It is almost in agreement with the result in table 12. In addition, the magnitude of the CARs at event windows [-10, -1], [-1, 1], [-3, 3] increases from 1.64%, 0.92% and 0.97% in table 16 to 2.12%, 1.07% and 1.72%, indicating that upgrades from buy to strong buy do not significantly affect the stock price. Regarding the sell groups, CARs are generally not significant, except for the CAR at window [0, 10], which is significant in a positive direction. The result is similar to the event study's finding that upgrades have investment value, but downgrades do not.

	observations	*mean*	*t-value*	*p-value*	*median*	*minimum*	*maxmium*
buy group							
CAR(-10,-1)	113	0.021152301	3.428029189	0.00042574 ***	0.0101034	-0.1286977	0.3646881
CAR(-1,-1)	113	0.010675824	2.729760032	0.003681482 ***	0.0053585	-0.201192	0.1282511
CAR(-3,3)	113	0.01719258	3.456741776	0.000386805 ***	0.0127498	-0.0891807	0.2411787
CAR(-5,5)	113	0.019459538	3.32294491	0.000601921 ***	0.0090565	-0.1109829	0.2439647
CAR(0,10)	113	-0.000281877	-0.052562023	0.479087256	-0.0049932	-0.1535997	0.1792421
CAR(-20,120)	113	0.007622719	0.311505225	0.377997833	0.0035473	-1.05127	1.160982
sell group							
CAR(-10,-1)	35	-0.011745926	-0.89152566	0.189456665	-0.0149381	-0.1544264	0.3310091
CAR(-1,-1)	35	0.010210477	1.098200269	0.139916758	-0.0000692	-0.1114191	0.1654519
CAR(-3,3)	35	0.00764976	0.714300421	0.239958522	0.0041376	-0.1640931	0.1749168
CAR(-5,5)	35	0.01208302	1.004347695	0.161152877	0.0087071	-0.103324	0.2261824
CAR(0,10)	35	0.03502432	1.89078242	0.033600104 **	0.0175581	-0.1064899	0.5301286
CAR(-20,120)	35	0.012161863	0.329659399	0.37183989	-0.0168797	-0.3336716	0.4761091

Table 32: Descriptive statistics for CAR

Test assumptions before regressing

Linear regression requires several basic assumptions (Poole & O'Farrell, 1971). 1. The

data do not exhibit multicollinearity or have very little multicollinearity. A high degree of correlation between independent variables is indicative of multicollinearity. 2. Low or nonexistent autocorrelation. Generally, autocorrelation is defined as the correlation between the same variables over successive time intervals. 3. The variance of the errors is constant, also known as homoscedasticity (Poole & O'Farrell, 1971). Therefore, this part will assess whether the regression model in this study complies with these assumptions.

Multicollinearity

Generally, a correlation matrix is used to determine whether independent variables are multicollinear. Multicollinearity occurs when more than two variables are significantly correlated. The correlation matrix for the total sample, the buy group, and the sell group can be found in tables 33,34, and 35 respectively. Three tables show that ANALYST and BROKERAGE are highly correlated, which is more than 88%. Poole and O'Farrell (1971) indicate that high correlation coefficients can lead to multicollinearity and unreliable estimators. In this case, in order to avoid multicollinearity, this study includes two different regression models where one excludes ANALYST while the other excludes BROKERAGE.

	analyst	*brokers*	*STRONG*	*SKIPRANK*	*MarketType*
analyst	1				
brokerage	0.933260726	1			
DISCOVER	-0.153385966	-0.147468517	1		
SKIP	-0.100914185	-0.060631849	0.138833711	1	
TYPE	-0.101550612	-0.1391105	-0.044699016	-0.078194744	1

Table 33: Correlation matrix for the total sample

	analyst	*brokers*	*STRONG*	*SKIPRANK*	*MarketType*
analyst	1				
brokerage	0.942634267	1			
DISCOVER	0.040543169	0.072176824	1		
SKIP	-0.038146984	-0.004314479	0.177281052	1	
TYPE	-0.083056195	-0.152995476	-0.022375602	-0.126215416	1

Table 34: Correlation matrix for the buy group

	analyst	*brokers*	*STRONG*	*SKIPRANK*	*MarketType*
analyst	1				
brokerage	0.880107408	1			
DISCOVER	-0.449253522	-0.435074066	1		
SKIP	-0.218454878	-0.154460261	0.051847585	1	
TYPE	-0.198489649	-0.08861443	-0.088431538	0.035533453	1

Table 35: Correlation matrix for the sell group

Autocorrelation

The autocorrelation in residuals results in unreliable standard errors, t-values, and p-values. In this case, the null hypothesis might be rejected regardless of whether it is true or false. The results in table 7 indicate that the revisions are clustered and issued mainly at the same time, which suggests cross-sectional dependence. This study will use "Cluster" in Stata to adjust autocorrelation, where robust standard errors are automatically used.

Homoscedasticity

The residual plots in figure 6 are associated with the buy group regression using CAR

over the short-term event window [−10, -1]. It is clear from the residuals that the distributions are not uniform, indicating that heteroskedasticity is present in this study. residual plots for each regression using a different event window is shown in the appendix from Table XI and Table XII.

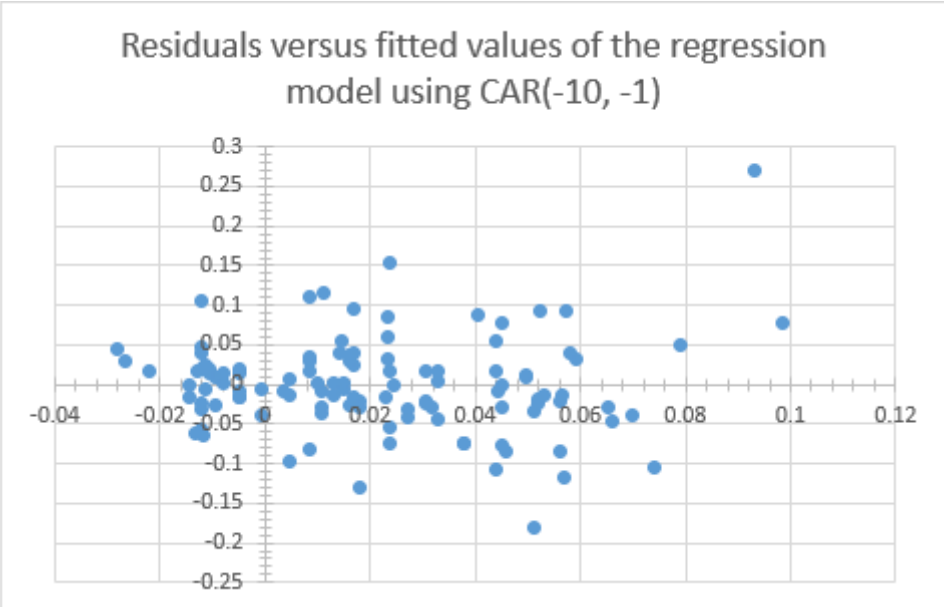

Figure 6

An analysis of residual plots is not sufficient to prove the existence of heteroskedasticity since the plots do not provide any specific test results. To determine whether residuals are homoscedastic or not, this study employed the Breusch-Pagan/Cook-Weissberg test. The null hypothesis for the Breusch-Pagan/Cook-Weissberg test is that residuals have a constant variance. Heteroskedasticity is present in 5 of the 12 regressions presented in the appendix XIII and XIV. Specifically, in the buy group, the regression for which the dependent variables are CAR (-10, -1) and CAR (-20, 120) exhibit heteroskedasticity. In contrast, the regressions of CAR (-10,-1), CAR (-3,3), and CAR

(-5,5) in the sell group contain heteroskedasticity. Heteroscedasticity in the residuals in this research may be due to some securities being more volatile than others and having greater variances. Accordingly, in this study, weighted regression is used to weight abnormal returns with a high variance less heavily than abnormal returns with low variance. In Stata, it is very easy to do this with the cluster.

Furthermore, outliers will also have a significant impact on the empirical results. As can be seen from the residual plot in the appendix XI and XII, some data are far away from others in this study. To prevent biases in coefficients and results, the data that is significantly different from the cumulative average abnormal return will be excluded.

After adjusting the data in accordance with the regression assumptions, regression results are more reliable. The regression results show in tables 36-39. Table 36 and Table 37 are the results for the buy groups, while table 38 and table 39 are the results for the sell groups.

Table 36

Determinants of the market reaction to buy group

*Throughout the table, the dependent variable is the cumulative abnormal return (which has already changed from the natural logarithm to the abnormal return) at a variety of event windows. A p-value in brackets indicates significance at the 10%, 5%, and 1% levels. * indicates statistical significance below the 0.10 level, ** below the 0.05 level, and *** below the 0.01 level.*

Here are the definitions of the independent variable:

ANALYST: number of analysts covered for a company

DISCOVERY: dummy variable, it equals one if the recommendation belongs to a strong buy

SKIP: dummy variable, it equals one if the recommendation skips a rank

TYPE: dummy variable, it equals one if the recommendation issued in the bull market

Variables	*CAR(-10, -1)*	*CAR(-1,1)*	*CAR(-3, 3)*	*CAR(-5, 5)*	*CAR(0, 10)*	*CAR(-20,120)*
ANALYST	0.0010449	0.0002255	0.0005594	0.0007122	0.0001728	0.0009686
	(0.01) ***	(0.381)	(0.108)	(0.061) *	(0.575)	(0.577)
DISCOVER	-0.0242987	-0.0071993	-0.0071605	-0.0545552	-0.0355504	-0.1527059
	(0.143)	(0.782)	(0.803)	(0.003) ***	(0.065) *	(0.07) *
SKIP	0.0369841	0.0221506	0.0144196	0.0300586	0.0087565	0.0541524
	(0.012) **	(0.011) **	(0.173)	(0.021) **	(0.389)	(0.307)
TYPE	0.0577593	-0.0054436	-0.003606	-0.0064027	-0.0563974	-0.0035696
	(0.075) *	(0.84)	(0.899)	(0.81)	(0.002) ***	(0.984)
Constant	-0.0368442	-0.0036985	-0.0096742	-0.0158755	-0.0035732	-0.0413964
	(0.023) **	(0.727)	(0.524)	(0.313)	(0.814)	(0.597)
observations	113	113	113	113	113	113
R-squared	0.1248	0.0577	0.0444	0.0831	0.096	0.0168

Table 37

Determinants of the market reaction to buy group

*Throughout the table, the dependent variable is the cumulative abnormal return (which has already changed from the natural logarithm to the abnormal return) at a variety of event windows. A p-value in brackets indicates significance at the 10%, 5%, and 1% levels. * indicates statistical significance below the 0.10 level, ** below the 0.05 level, and *** below the 0.01 level.*

Here are the definitions of the independent variable:

BROKERAGE: number of brokerage firms covered for a company

DISCOVERY: dummy variable, it equals one if the recommendation belongs to a strong buy

SKIP: dummy variable, it equals one if the recommendation skips a rank

TYPE: dummy variable, it equals one if the recommendation issued in the bull market

Variables	*CAR(-10, -1)*	*CAR(-1,1)*	*CAR(-3, 3)*	*CAR(-5, 5)*	*CAR(0, 10)*	*CAR(-20,120)*
BROKERAGE	0.0018818	0.0003001	0.0010201	0.0014268	0.0004412	0.0019687
	(0.041) **	(0.614)	(0.22)	(0.121)	(0.535)	(0.608)
DISCOVER	-0.0194957	-0.0061629	-0.0045892	-0.0512814	-0.034756	-0.1482535
	(0.262)	(0.81)	(0.876)	(0.004) ***	(0.068) *	(0.065) *
SKIP	0.0357818	0.0218475	0.0137812	0.0292986	0.0086113	0.0531304
	(0.019) **	(0.012) **	(0.196)	(0.025) **	(0.674)	(0.319)
TYPE	0.0585142	-0.0053854	-0.0031893	-0.0057458	0.0392	-0.0026484
	(0.08) *	(0.843)	(0.911)	(0.829)	(0.018) **	(0.988)
Constant	-0.0321367	-0.0004111	-0.0074258	-0.0157556	0.002	-0.041838
	(0.082) *	(0.973)	(0.676)	(0.401)	(0.749)	(0.625)
observations	113	113	113	113	113	113
R-squared	0.1176	0.052	0.033	0.0749	0.0913	0.016

Table 38

Determinants of the market reaction to sell group

*Throughout the table, the dependent variable is the cumulative abnormal return (which has already changed from the natural logarithm to the abnormal return) at a variety of event windows. A p-value in brackets indicates significance at the 10%, 5%, and 1% levels. * indicates statistical significance below the 0.10 level, ** below the 0.05 level, and *** below the 0.01 level.*

Here are the definitions of the independent variable:

ANALYST: number of analysts covered for a company

DISCOVERY: dummy variable, it equals one if the recommendation belongs to a strong sell

SKIP: dummy variable, it equals one if the recommendation skips a rank

TYPE: dummy variable, it equals one if the recommendation issued in the bear market

Variables	*CAR(-10, -1)*	*CAR(-1,1)*	*CAR(-3, 3)*	*CAR(-5, 5)*	*CAR(0, 10)*	*CAR(-20,120)*
ANALYST	-0.0017113	0.0008813	0.0010952	-0.0003554	-0.0032533	-0.0003167
	(0.546)	(0.016) **	(0.086) *	(0.792)	(0.073) *	(0.435)
DISCOVER	0.049059	-0.0004911	-0.0181931	-0.006411	-0.1246369	-0.1269209
	(0.297)	(0.996)	(0.842)	(0.927)	(0.091) *	(0.392)
SKIP	0.0190976	-0.0110536	0.0054818	-0.0079372	-0.0355847	-0.0120939
	(0.109)	(0.669)	(0.68)	(0.522)	(0.096) *	(0.836)
TYPE	-0.0108652	-0.0155836	-0.0295002	-0.0290659	-0.1176088	0.1105736
	(0.767)	(0.16)	(0.063) *	(0.193)	(0.019) **	(0.076) *
Constant	0.0376667	-0.0163365	-0.0309862	0.0308753	0.1902186	0.0371125
	(0.727)	(0.518)	(0.301)	(0.542)	(0.055) *	(0.099) *
observations	35	35	35	35	35	35
R-squared	0.1097	0.062	0.0802	0.0115	0.1449	0.0526

Table 39

Determinants of the market reaction to sell group

*Throughout the table, the dependent variable is the cumulative abnormal return (which has already changed from the natural logarithm to the abnormal return) at a variety of event windows. A p-value in brackets indicates significance at the 10%, 5%, and 1% levels. * indicates statistical significance below the 0.10 level, ** below the 0.05 level, and *** below the 0.01 level.*

Here are the definitions of the independent variable:

BROKERAGE: number of brokerage firms covered for a company

DISCOVERY: dummy variable, it equals one if the recommendation belongs to a strong sell

SKIP: dummy variable, it equals one if the recommendation skips a rank

TYPE: dummy variable, it equals one if the recommendation issued in the bear market

Variables	*CAR(-10, -1)*	*CAR(-1,1)*	*CAR(-3, 3)*	*CAR(-5, 5)*	*CAR(0, 10)*	*CAR(-20,120)*
BROKERAGE	-0.0040777	0.0012396	0.0013462	-0.00076	-0.0047628	-0.0026877
	(0.234)	(0.283)	(0.165)	(0.54)	(0.051)	(0.339)
DISCOVER	0.043831	-0.0047777	-0.025095	-0.0067924	-0.1103276	-0.1435684
	(0.106)	(0.961)	(0.782)	(0.907)	(0.143)	(0.302)
SKIP	0.0201852	-0.0129139	0.0028766	-0.0075801	-0.0289994	-0.0148139
	(0.313)	(0.635)	(0.819)	(0.644)	(0.011)	(0.814)
TYPE	-0.0042609	-0.0216618	-0.0376575	-0.0274242	-0.0957524	0.1057814
	(0.765)	(0.123)	(0.023) **	(0.03) **	(0.01) **	(0.057) *
Constant	0.0527804	-0.0061658	-0.0142952	0.0322022	0.1565697	0.0802478
	(0.371)	(0.874)	(0.574)	(0.172)	(0.04) **	(0.178)
observations	35	35	35	35	35	35
R-squared	0.11100	0.0524	0.0651	0.0123	0.134	0.0566

Hypothesis 4: Brokerage analysts' revisions contain information relevant to different types of markets

This hypothesis indicates that brokerage analysts' revisions may influence prices in the direction they predicted in a normal market, a bull market, and a bear market. The event study has already tested this hypothesis. In addition, it was retested in the regression by using a dummy variable 'TYPE'. In the case of the buy group, it takes the value 1 if the revision occurs during a bull market. For the sell group, it takes the value 1 if the revision occurs during a bull market.

Tables 36 and 37 provide the results for TYPE in the buy groups. There is a positive significant CAR in the window (-10, -1), whereas in the other windows, the results are almost negative. This indicates that upgrade revisions during the bull market have a pre-event drift of approximately 5.8% as compared to other markets. Similar to the result in the event study, the magnitude of the upgrade revision in the bull market is higher than in other markets.

Tables 38 and 39 show the result for TYPE in the bear market. In most cases, the results are negative, with the exception of the CAR in the window (-20, 120), which has a statistically significant positive value. In other words, downgrade revisions are not valuable over the long term. Furthermore, the results in windows (-3,3) and (0,10) are statistically significant negative for both tables, indicating that downgrade revisions in the bear market have investment value to some extent. This result is different from the

result in the event study because the sample choosing is different. The sell group excludes downgrade revision from strong buy to buy and sell to strong sell, while the sample in the event study includes the whole downgrade revisions. As a result, the downgrade revisions from hold, buy, strong buy to sell, and strong sell is valuable in a bear market.

TYPE indicates that the results of the event study are insufficient. The results for upgrade revisions are similar, where upgrade revisions in bull markets are more valuable. However, the results for downgrade revisions in the event study are not sufficient. There are some downgrade revisions in the Chinese stock market that are valuable, such as those downgrade revisions from hold, buy, strong buy to sell and strong sell, and issued during a bear market. According to Table 5, in a bear market, the percentage of strong sell recommendations increases from 0.65% to more than 3%. This part indicates that these analysts are highly skilled, and their recommendations are valuable. As a result, hypothesis 4 is partially accepted.

Hypothesis 5: Recommendation revisions for firms with high coverage have a lower price reaction.

The fifth hypothesis suggested that firms with high analyst and brokerage firm coverage would experience a lower price reaction. As described in the method, this research incorporates two explanatory variables ANALYST and BROKERAGE to examine the hypothesis. ANALYST indicates how many analysts are covered by a company, while BROKERAGE indicates how many brokerage firms are covered by the company. The hypothesis supposed that an increase in analyst and broker coverage would be expected

to result in lower positive cumulative abnormal returns for the buy group and lower negative cumulative abnormal returns for the sell group since more coverage results in more information available and less information asymmetry. Therefore, the coefficients of ANALYST and BROKERAGE should be negative for the buy group and positive for the sell group.

ANALYST's regression results are shown in Table 35 for the buy group and in table 38 for the sell group. Tables 36 and 38 show the regression results for the BROKERAGE for the buy and sell groups, respectively. With respect to the ANALYST, the coefficient in table 36 is positive and significant at a 1% level when using CAR (-10, -1), meaning that an increase in analyst coverage will result in a higher positive abnormal return for the buy group before the announcement of the upgrade revision. CAR (-5,5) also shows positive and significant results at the 10% level. It is important to note that, even though ANALYST does not produce significance under other CARs, its coefficient is positive. As a result, this result rejects the hypothesis that the coefficient of the ANALYST for the buy group is expected to be negative. Regarding the ANALYST in the sell group, the coefficient in table 38 is positive and statistically significant when using CAR (-1,1) and CAR (-3,3), it indicates an increase in analyst coverage will lead to higher negative cumulative abnormal returns at the event window (-1,1) and (-3,3). The coefficient, however, becomes negative and statistically significant in the post-event period (0, 10). Therefore, the hypothesis for the sell group will be partially received under event windows (-1,1) and (-3,3).

When it comes to the BROKERAGE for the buy group, the coefficient in table 37 is

positive and significant at the 5% level when using CAR (-10, -1). It suggests a greater brokerage house coverage will result in a higher positive abnormal return on the buy recommendation. Furthermore, the coefficients of BROKERAGE in other CAR models are positive but not statistically significant. Hence, this result rejects the hypothesis that BROKERAGE coefficients are negative. Regarding the BROKERAGE for the sell group, table 39 shows that the coefficients of BROKERAGE for the sell group are not statistically significant across the entire model. It suggests that the brokerage coverage does not create any abnormal return for the sell group. Accordingly, the hypothesis would be rejected.

Overall, hypothesis four is mostly rejected except in some circumstances. In this study, the number of analysts is positively related to abnormal returns for the buy group, which is contrary to the hypothesis. As for the sell group, the result can be partially accepted and limited to the time intervals of (-1,1) and (-3,3). With respect to the BROKERAGE, brokerage coverage is positively correlated with abnormal returns for the buy group while it is not significantly correlated for the sell group. Therefore, the hypothesis would be rejected based on the independent variable BROKERAGE.

Hypothesis 6: Brokerage analysts make a significant contribution to price discovery.

The sixth hypothesis suggests that brokerage analysts contribute significantly to price discovery. Specifically, analysts have the ability to identify undervalued and

overvalued stocks. This hypothesis test is conducted with two explanatory variables, DISCOVERY and SKIP. DISCOVER is a dummy variable that equals one if the recommendation upgrades to a strong buy for the buy group and downgrades to a strong sell for the sell group. The SKIP variable is also a dummy variable that is equal to one if the recommendation skips a rank, and zero otherwise. The fifth hypothesis supposes that analysts contribute to the price discovery, therefore, recommendations that upgrade (downgrade) to a strong buy (strong sell) are expected to be more influential than other recommendations. Similarly, skip-rank recommendations are expected to have a greater impact than those that do not skip ranks. In this case, the coefficients of DISCOVERY and SKIP are expected to be positive for the buy group and negative for the sell group.

With respect to the buy groups, table 36 and table 37 show that DISCOVERY coefficients are negative across all models, but they are statistically significant only at windows (-5,5), (0, 10) and (-20,120) for both tables. It suggests that there are negative abnormal returns for stocks that upgrade to the strong buy in the event windows of (-5,5), (0,10), and (-20,120), when compared to stocks that upgrade to buy. While in other event windows, strong buy upgrades do not lead to additional abnormal returns over buy upgrades. Therefore, this result rejects the fifth hypothesis that DISCOVERY should have a positive coefficient. It suggests that brokerage analysts do not play a significant role in price discovery. It is not surprising that the percentage of strong buys increases from 10% to more than 21% in a bear market as shown in table 5. These strong buy recommendations may be related to the negative value for DISCOVERY in tables 36 and 37.

Regarding the sell group, DISCOVERY has a negative coefficient only at the window (0,10) in table 38. The coefficients for the rest of the models in tables 38 and 39 are mostly negative except for the model that uses CAR (-10, -1). It indicates that a downgrade to strong sell is more likely to have a negative 12.46% effect on the price than a downgrade to hold and sell. Therefore, the results support the hypothesis, but they are not strong enough because only one model has a negative DISCOVERY that is statistically significant.

When it comes to the explanatory variable SKIP, it is positive across all models in tables 36 and 37, but only statistically significant in windows (-10, -1) and (-1,1). Specifically, in the event window (-10, -1), upgraded recommendations to buy/strong buy skipping a rank have a positive marginal effect of 3.7% on abnormal return. This number decreases to 2.2% when the event window changes from (-10, -1) to (-1,1). Due to all coefficients of the SKIP being positive, the hypothesis for the buy group will be accepted.

Regarding the independent variable SKIP for the sell group, except for the event window (-10,-1), the SKIP coefficients in table 38 and table 39 are mostly negative. However, the coefficient is statistically significant only at the 10% level at the event window (0, 10) in table 37. Specifically, the cumulative abnormal return is negatively impacted by 3.6% when downgrading the recommendation to hold, sell, or strong sell in the event window (0, 10). As a result, the hypothesis of a negative coefficient for the sell group will be accepted.

Overall, the results for the sell group are consistent with the hypothesis that analysts contribute significantly to price discovery. Regarding the statistical analysis, both variables DISCOVERY and SKIP are statistically significant in the negative direction. Economically, the DISCOVERY variable indicates that a downgrade to strong sell will have a negative price effect of 12.46% compared to a downgrade to hold and sell. SKIP variable indicates that a skip rank has a -3.6% impact on abnormal returns. Therefore, the analysts contribute significantly to the price discovery for the sell group.

However, the results for the buy group are controversial. Specifically, the result of the negative explanatory variable DISCOVERY indicates that upgrading to strong buy is not associated with an increase in abnormal returns over upgrading to buy. While the variable SKIP supports the hypothesis with its positive and significant coefficient, showing an abnormal return effect of 3.7% from upgraded recommendations to buy/strong buy skipping a rank. Consequently, there is insufficient evidence to support the claim that analysts play a significant role in price discovery.

Additional test:

Based on the TYPE results in the regression, the results in the event study are not sufficient. It is evident from the event study that downgrade revisions do not have investment value. However, the regression shows that not all downgrade revisions are invaluable. There is an investment value in downgrade revisions from hold, buy, strong buy to sell and strong sell, which is issued during a bear market. Furthermore, table 38 shows that the SKIP dummy variable has a negative statistical significance for the sell

group. Therefore, to ensure that the downgrade revision results are adequate, the event study will only be applied to downgrades from buy and strong buy to sell and strong sell to determine whether downgrade revisions with high skip ranks are valuable.

Table 40 shows the average abnormal return for the downgrade revision that changed from a strong buy and buy to a strong sell and sell. Surprisingly, the results at pre-event t=-2 and post-event t=-1 are statistically significant and negative. It means that high skip rank downgrade revisions have a negative abnormal return 2 days before and 1 day after the announcement date. Economically, the negative abnormal return at t=+1 exceeds 4%. Therefore, the high skip rank downgrade revision has an investment value.

t	AAR	T	p	star
-10	0.029553	4.101751	7.54E-05	***
-9	-0.04021	-5.56229	1.66E-07	***
-8	0.047207	6.552613	1.52E-09	***
-7	0.052148	7.240217	4.80E-11	***
-6	0.042523	5.898985	3.51E-08	***
-5	0.035375	4.856508	3.67E-06	***
-4	0.006768	0.937907	0.350192	
-3	0.009246	1.283557	0.201791	
-2	-0.01363	-1.88732	0.061553	*
-1	-0.00565	-0.78107	0.436315	
0	0.007803	1.082521	0.28121	
1	-0.04089	-5.64405	1.15E-07	***
2	0.019435	2.697621	0.007998	***
3	0.009375	1.297212	0.197068	
4	0.042491	5.891348	3.64E-08	***
5	-0.00247	-0.34219	0.73281	
6	-0.06494	-8.97981	4.85E-15	***
7	-0.03513	-4.87363	3.42E-06	***
8	-0.00457	-0.62424	0.533666	
9	0.00582	0.805856	0.421933	
10	0.008844	1.22651	0.222428	

Table 40: AAR result for the high skip rank

Table 41 displays the cumulative abnormal return for high skip rank downgrade revisions. There is a statistically significant negative abnormal return at the event window (-1, 1) and (-2,2). Recall in table 39 that the significance of cumulative average abnormal returns (CAAR) during these intervals is largely due to the significant average abnormal returns during the t=+1, which is more than -4%. Moreover, the post 10 days event drift exceeds -5.4%, which means that investors who follow the revision and sell immediately can avoid a loss of more than -5.4% in ten days. Therefore, the high skip rank downgrade revisions are valuable.

t	CAAR	T	p	star
[-20;20]	0.342439	5.605175	1.37E-07	***
[-20;-11]	0.298007	10.67373	4.57E-19	***
[-10;-1]	0.163327	5.808994	5.35E-08	***
[-1;1]	-0.03874	-2.53309	0.012607	**
[-2;2]	-0.03293	-1.66864	0.097818	*
[0;10]	-0.05423	-1.85172	0.066546	*
[11;20]	-0.06466	-2.31721	0.022202	**
[21;30]	-0.00817	-0.293	0.770034	
[31;40]	0.01029	0.367881	0.713616	
[41;50]	0.036745	1.315974	0.190712	
[51;60]	0.042116	1.510797	0.133491	
[61;70]	0.056449	2.0228	0.045335	**
[71;80]	0.018197	0.650946	0.516337	
[81;90]	0.008924	0.319679	0.749772	
[91;100]	0.074001	2.637445	0.009469	***
[101;110]	0.006	0.214791	0.830298	
[111;120]	-0.04762	-1.70951	0.089963	*
[-5;120]	0.110145	0.501466	0.61697	
[-20;120]	0.53937	2.010087	0.046684	**

Table 41: CAAR result for the high skip rank

6.0 Conclusion

The purpose of this thesis was to analyze market reactions to brokerage analysts' recommendations on firms included in the FTSE China A50 index. A major research question in this thesis is "whether Chinese brokerage analysts' recommendations have investment value". To analyze this research question, a variety of research methods were used, including descriptive statistics, event studies, and cross-sectional regression analysis.

For the purpose of making the results more relevant to today, the time period covered by this research ranges from 2012 to 2020. Previous literature like Womack (1996) found that recommendations add value to the firm. Obviously, these results do not support the semi-strong and strong theory of the efficient market hypothesis, which states that fundamental analysis and technical analysis cannot produce an abnormal return. The ability of analysts to identify mispricing in stock prices can be seen in their recommendation revisions (Crane & Crotty, 2020). Thus, this study primarily examines the impact of revisions to recommendations on market reaction. An analyst's recommendation revision is a change in rating toward the same company from the same analyst. Reiterations of recommendations are excluded from this study, only upgrade and downgrade revisions are considered in this research.

From the descriptive statistics based on the whole sample, it can be concluded that Chinese analysts are more likely to issue favorable recommendations than unfavorable recommendations, which is consistent with previous literature. Aside from some of the

reasons that previous literature has provided to explain this phenomenon, the Chinese stock market has its unique characteristics, including limited short selling and conflicts of interest between analysts and bonuses. The research also provided descriptive statistics for the recommendations in both the bull market and the bear market. In the bull market, Chinese analysts have issued fewer sell recommendations, more hold recommendations, and almost no change in buy recommendations. While in the bear market, analysts are more likely to issue strong buy and strong sell recommendations. Accordingly, some Chinese brokerage analysts are not capable of detecting bullish or bearish markets and are therefore not skilled.

With respect to the analysts' preference, each company is covered by more than 30 analysts and 30 brokerage firms. Furthermore, the largest Chinese firms Kweichow Moutai have the highest number of analysts, brokerage firms, and recommendations. When it comes to industry preference, analysts are more inclined to cover companies in the sectors of consumer discretionary and real estate and are less inclined to recommend firms in the information technology sector. Additionally, analysts are likely to give favorable ratings to firms in the sector of consumer staples, while unfavorable ratings are likely to be given to firms in the sector of energy.

This thesis also examined whether the piggyback phenomenon exists in the Chinese stock market. Piggyback theory indicates that analysts are likely to piggyback their recommendations and revisions on prior firm news. In this case, two recommendation transition matrices have been established. One is for the entire sample, while the other excludes the events with firm events. It is interesting to find that more than 72.9% of

the recommendations follow the earning announcement, indicating that Chinese brokerage analysts are likely to issue revisions following earnings announcements. After excluding the recommendations that were associated with firm events, the number of recommendations (revisions) decreased from 16049 (670) to 3770 (223) suggesting that analysts tend to piggyback their recommendations on previous events. Additionally, the majority of revisions are centered around the rating of buy and hold, suggesting that analysts generally revise their previously announced buy and hold recommendations. Considering that all analysts have access to the same information, it is not surprising that they have come to the same conclusions. In terms of upgrade and downgrade revisions, the number of upgrade revisions in both tables are significantly larger than downgrade revisions, indicating that analysts are unlikely to issue downgrade revisions

Following from the piggyback analysis, an event study was used to identify the specific impact of recommendations revisions on stock prices before and after the revision announcement. Six event studies with different samples were examined, including a total sample, a sample without firm events, a sample without firm events in a bull market, a sample without firm events in a bear market, a buy group, and a sell group. The first four event studies aimed at finding whether brokerage analysts' revisions contain information across different types of markets. The last two event studies are prepared for the cross-sectional regression analysis.

The event study for the entire sample showed that there was a significant positive abnormal return for upgrades in the pre-event period and a significant negative abnormal return for downgrades in the pre-event period. Specifically, there is a pre-

event drift of 1.26% for the upgrade revision at the window (-10, -1). There is a pre-event drift of -0.62% for the downgrade revision at the window (-1, 0). Comparatively, the post-event drift is almost nonexistent. It is unclear whether this pre-event drift is caused by the leakage of revisions or by firm events. The second event study conducted on the sample without firm events, The results in the upgrade revision are still statistically significant and positive, and the magnitude for the pre-event drift at the window (-10, -1) increases from 1.26% to 1.64%. While for the downgrade revision, there were no average abnormal returns in the pre-event and post-event periods. Consequently, after excluding revisions with firm events, an upgraded revision contains information, while a downgraded revision does not contain information. In this study, some possible explanations for the insignificant downgrade revision have been identified, including limited short-selling and target samples. Specifically, the Chinese stock market has a high threshold for short selling, so downgrade revisions are not profitable for most of the investors who do not own stocks. Additionally, only big companies are examined in this study, and the stock prices of these big companies are dominated by institutional investors, who are long-term investors and emphasize the financial report rather than the research report. In this case, institutional investors will not be able to sell the shares easily.

The third and fourth event studies were conducted in bull and bear markets without firm events. For the bull market, the results in the pre-event period for upgrade revision are still statistically significant and the magnitude increases in average abnormal returns at t=-3, -2, -1, 0 from 0.42%, 0.12%, 0.5%, 0.42% to 1.02%, 1.36%, 0.85%, 1.3%. Additionally, the pre-event drift at the window (-10, -1) increases from 1.64% to 4.92%, which implies a 4.92% abnormal return in upgrade revisions 10 days before the revision

announcement. However, for the downgrade revisions, the pre-event and post-event periods did not show any significant negative abnormal returns, indicating that downgrade revisions are of no value to investors in the bull market. There is also a 4.7% post-event drift found at the window (0, 10), indicating that investors will lose an average of 4.7% if they follow the revision during the event window (0, 10). With respect to the bear market, neither revision shows a statistically significant average abnormal return around the announcement date, suggesting that revisions in a bear market have no investment value. The result of the upgrade revision in the bull market is not surprising as the percentage of the strong buy increases from 10% in the normal market to over 21% in the bear market. This insignificant result may be attributed to these non-skilled analysts.

As a result of these four event studies, a few conclusions can be drawn. Firstly, it is important to note that brokerage analyst revisions have leaked, which means that some investors have already received the revision before it has officially been announced. Additionally, downgrade revisions are not useful for all investors due to the limitations associated with short selling in Chinese markets and the sample selection used in this study. As regards the upgrade revisions, investors without access to the information in advance cannot profit from the revisions in any market. Those who obtain information in advance can only expect abnormal returns during normal and bull markets. Specifically, investors can earn 1.64% cumulative abnormal returns when they receive the upgrade revision 10 days before the announcement. This number increases from 1.64% to 4.92% in a bull market. Comparatively, in the bear market, the brokerage analysts' revisions do not have any investment value for all investors.

The fifth and sixth event studies are the preparation for the regression analysis. Upgrade revisions are called buy groups and downgrade revisions are called sell groups. The buy group differs from previous upgraded revisions in that the buy group does not include recommendations which change from strong sell to sell, strong sell and sell to hold, and buy to strong buy. While the sell groups exclude the recommendation that changes from strong buy to buy and sell to strong sell. For the buy group, the magnitude of the average abnormal return in the pre-event window is higher than the average for the entire period but lower than the average for the bull market. Buy group investors who receive advance information 10 days before the announcement date can expect to earn an abnormal return of 2.1% on average. In the sell group, the results are not significant, but the p-value at t=-1 is close to 0.1 when compared with the downgrade revision in other event studies.

A cross-sectional regression analysis was conducted to identify the determinants of market response to recommendation revisions by analyzing both pre-event performance and post-event performance across different event windows. A total of 113 buy recommendations and 35 sell recommendations were included in the final list of recommendation revisions. Buy groups have cumulative abnormal returns of 2.1% in the pre-event window (-10, -1) and sell groups have cumulative abnormal returns of 3.5% in the post-event window (0, 10).

Several independent variables were examined to explain the market's response to the revised recommendation, including revisions made during a bull market (in the case of

the buy group) or a bear market (in the case of the sell group), analyst coverage, broker coverage, whether the revision upgrades to strong bull or downgrade to strong sell, and whether the recommendation skipped a rank.

According to the results, market sentiments at the event window (-10, -1) were positively correlated with buy groups and had a tendency to drift about 5.8% prior to the event. The results for the sell group in the long-term event window (-20, 120) are positive and significant, suggesting that the sell recommendation has no value over the long term. Comparatively, windows (-3,3) and (0,10) show statistically significant negative results, indicating that downgrade revisions in a bear market can have some investment value. Based on this finding, the results of the event study are not sufficient, as the event study demonstrates that downgrade revisions in the bear market are not worth investing in. Therefore, the results in the regression provide a complement to the results in the event study. There are some downgrade revisions in the Chinese stock market that are valuable, such as those downgrade revisions from hold, buy, strong buy to sell and strong sell, and issued during a bear market. We are not surprised by this result, as the descriptive analysis revealed that the percentage of strong sell recommendations has increased from 0.65% to more than 3% in the bear market. These analysts are highly skilled at identifying bear markets.

With respect to the firm and brokerage coverage, for the buy group, the number of analysts and brokerage firms is positively related to abnormal returns under the event window (-10, -1). Comparatively, no significant values were observed across different event windows for the sell group. As a result, the price reaction for lightly followed

firms in the buy group is smaller than the reaction for heavily followed firms.

Considering the price discovery ability of analysts, the results show that strong buy upgrades do not lead to additional abnormal returns for the buy group. As a result, the analysts in the buy group do not contribute significantly to price discovery. However, this result is not surprising as the percentage of strong buys increases from 10% to more than 21% in a bear market based on the descriptive analysts. It may be attributed to these strong buy recommendations. When it comes to the sell group, negative results are found across nearly the entire window, but only the coefficient in the window (0, 10) is significant, suggesting that downgrading to a strong sell has a negative impact on the price, but not strong enough. Therefore, upgrading to strong buy does not have an additional abnormal return compared to upgrading to buy, whereas downgrading to strong sell has an additional impact compared to downgrading to hold and sell.

Additionally, upgrade revisions and downgrade revisions with a rank skip have a greater price effect than revisions without a rank skip. Specifically, in the event window (-10, -1), upgraded recommendations to buy/strong buy skipping a rank have a positive marginal effect of 3.7% on abnormal return. The cumulative abnormal return is negatively impacted by 3.6% when downgrading the recommendation to hold, sell, or strong sell in the event window (0, 10).

Therefore, the analysts contribute significantly to the price discovery for the sell group. In contrast, there is insufficient evidence to support the claim that analysts play a

significant role in the discovery of prices for the buy group.

Based on the regression results, the event study results are not sufficient. As the event study demonstrates, downgrade revisions have no investment value. Nevertheless, the regression indicates that downgrade revisions from hold, buy, strong buy to sell and strong sell during a bear market have investment value. Furthermore, regression results indicate that downgrade revisions with a rank skip have a greater price impact than revisions without a rank skip. To ensure that the downgrade revision results are adequate, the additional test applies the event study to downgrade revisions from buy and strong buy to sell and strong sell to determine whether the revisions with a high skip rank are useful. The result shows that in the 1 day following the announcement, downgrade revisions with a high skip rank have an abnormal return of -4%. Moreover, the post 10 days event drift exceeds -5.4%, which means that investors who follow the revision and sell immediately can avoid a loss of more than -5.4% in ten days. Therefore, the high skip rank downgrade revisions are valuable.

To sum up, the results of the event studies, multiple cross-sectional regressions, and additional tests suggest that whether a recommendation contains information depends on the type of analyst. In the case of investors who do not have access to the revision prior to its release, only high skip rank downgrade revisions are able to prevent a loss of more than -5.4% at the window (0, 10). For investors who have access to information in advance, upgrades are profitable in all market conditions except during bear markets. Over the whole period, the magnitude of the pre-event 10 days' abnormal return was 1.64%, and in a bull market, it was 4.92%. In the case of downgrade revisions, only

those revisions with a high skip rank are valuable investments.

There are several possible explanations as to why most of the downgrade revisions are invaluable. Firstly, the limited stock, limited brokerage firms, and capital requirements make it difficult to short sell in the Chinese stock market. For investors who are unable to short-sell, downgrade revisions are not profitable. Additionally, this study only examines FTSE China A50 indies, which are large companies. Stock prices of these big companies are heavily influenced by institutional investors, who are long-term investors and emphasize the financial report rather than the research report. In this case, institutional investors will not be able to sell the shares easily.

Another interesting result is that hold recommendations only account for 7% in this sample, whereas hold recommendations account for more than 30% in the other countries from the previous literature. This may be a result of the conflict between Chinese sell-side analysts and bonuses. Analysts' bonuses account for more than half of their basic salaries and the bonuses are based on the broker houses' annual earnings. Most Chinese brokerage firms earn their money by commissions, while some American brokerage houses earn their money by reinvesting client funds. As a result, analysts who issue hold recommendations do not contribute to any trade and therefore no commission occurred, which will influence their bonus.

Additionally, it is interesting to note that analysts tend to recommend firms in the consumer discretionary and real estate sectors rather than those in the information

technology sector. In contrast, the previous literature indicates that most American analysts cover the information technology sector. Analysts' preferences for industries differ across countries, possibly reflecting national differences. Specifically, China is one of the world's largest manufacturing countries that specialize in manufacturing which belongs to the category of consumer discretionary. The United States has the most advanced technology in the world, so it is not surprising that American analysts tend to focus on information technology. As a result, the preference for analysts may be indicative of the characteristics of this country.

Economically, this research gives one possible explanation for why most Chinese individual investors fail to gain profits. First, more than 87.3% of individual investors' capital is less than 500000 Chinese yuan (approximately 80000 USD). It is unlikely that those investors will pay money to analysts to get recommendations in advance since profits may not be enough to cover those fees. However, these recommendations have already been leaked to those who can afford to pay analysts enough money, primarily institutional investors. Therefore, asymmetric information exists between individual investors and institutional investors. The individual investors who saw those revisions and followed them were unable to earn any abnormal returns based on the result in this research.

In terms of future research, it will be interesting to determine whether recommendations have investment value for small and medium-sized companies. The first question to be addressed is whether recommendation leakage still occurs in small and medium-sized firms. In contrast to big companies, small companies are less likely to leak information.

As a result, only a small portion of investors might have access to the information in advance, and the results of the pre-event may not be significant. As a result, the piggyback theory may not exist in small and medium-sized firms. Also, as small and medium-sized companies in the Chinese stock market are dominated by individual investors, the market reaction must be more volatile than that of large corporations. There may be a stronger explanation for why most Chinese individual investors are unable to earn profits based on the results of small and medium-sized firms.

Furthermore, the difference between Chinese and American analysts' preferences may reflect the characteristics of this country. Can this result be replicated in other countries, such as the United Kingdom and Europe? With China now wishing to transfer from being among the top manufacturing countries to being among the top technological countries, does this increase the frequency of the recent recommendations for information technology? If it does, the tendency of the herd effect of the analysts may be able to predict the country's future development.

In addition, the descriptive statistics indicate that both the percentages of strong buys and strong sells increase in bear markets, while the percentage of buy recommendations in bull markets almost remains the same. This indicates that not all analysts are skilled. Therefore, future research can determine the distribution of skilled and unskilled analysts in the normal market, bull market, and bear market in accordance with Crane and Crotty (2020), who found that more than 93% of analysts are skilled.

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Appendices:

Name
360
S.f.Holding Co.,Ltd.
Agricultural Bank Of China Limited
Anhui Conch Cement Company Limited.
Bank Of China Limited
Bank of Communications Co.,Ltd.
Baoshan Iron & Steel Co.,ltd
BOB
CHINA CITIC BANK CORPORATION LIMITED
China Communications Construction Company Limited
China Construction Bank Corporation
CHINA EVERBRIGHT BANK
China Life Insurance Company Limited
China Merchants Bank Co.,Ltd.
China Merchants Shekou Industrial Zone Holdings CO.,Ltd.
China Minsheng Banking Corp.,Ltd.
China Pacific Insurance (Group) Co., Ltd
China Petroleum & Chemical Corporation
China Railway Construction Corporation Limited
CHINA RAILWAY GROUP LIMITED
China Shenhua Energy Company Limited
China State Construction Engineering Corporation Limited
China United Network Communications Limited.
China Vanke Co.,Ltd
China Yangtze Power Co.,Ltd.
CITIC Securities Co., Ltd(600030.SH)
CRRC Corporation Limited
Foshan Haitian Flavouring and Food Company Ltd.
Foxconn Industrial Internet Co., Ltd
Gree Electric Appliances,Inc.of Zhuhai
Guotai Junan Securities Co., Ltd(601211.SH)
HIKVISION DIGITAL TECHNOLOGY CO., LTD
Industrial And Commercial Bank Of China Limited
Industrial Bank CO.,LTD.
Inner Mongolia Yili Industrial Group Co.,Ltd.
Jiangsu Hengrui Medicine Co.,Ltd.
Jiangsu Yanghe Brewery Joint-Stock Co.,Ltd.

Kweichow Moutai Co.,Ltd
Midea Group Co.,ltd
New China Life Insurance Company Ltd.
Petrochina Company Limited
Ping An Bank Co.,Ltd.
Ping An Insurance (Group) Company Of China,Ltd.
Poly Developments and Holdings Group Co., Ltd
SAIC Motor Corporation Limited
Shanghai International Port (Group) Co., Ltd.
Shanghai Pudong Development Bank Co.,Ltd.
Shenzhen Mindray Bio-Medical Electronics Co., Ltd.
Wens Foodstuff Group Co., Ltd.
Wuliangye Yibin Co.,Ltd

Table I: Name of the firm in FTSE A50 China index

t	AAR	T	p	star	t	AAR	T	p	star	t	AAR	T	p	star
-20	-0.0013	-1.476	0.1426		32	-0.0013	-1.4555	0.14818		84	-0.0018	-1.9495	0.05359	*
-19	-0.0032	-3.6803	0.00035	***	33	-0.0006	-0.6331	0.52786		85	-0.0022	-2.4586	0.01539	**
-18	-0.0011	-1.3028	0.19517		34	-0.0013	-1.4386	0.1529		86	0.00084	0.91997	0.35945	
-17	0.00141	1.61334	0.10932		35	0.00126	1.42447	0.15693		87	-0.0002	-0.1897	0.84984	
-16	-0.0006	-0.7007	0.48487		36	0.00163	1.85172	0.06655	*	88	-0.0006	-0.6739	0.50168	
-15	-0.0019	-2.1163	0.0364	**	37	0.0004	0.45222	0.65193		89	-0.0006	-0.6658	0.50682	
-14	0.00113	1.2842	0.20157		38	-0.0002	-0.2618	0.79392		90	-0.0012	-1.3331	0.18505	
-13	0.0009	1.03052	0.30486		39	-0.0001	-0.1175	0.90666		91	0.00013	0.14949	0.88142	
-12	0.00026	0.29214	0.77069		40	-0.0009	-0.9899	0.32421		92	-0.0014	-1.5892	0.11468	
-11	0.00175	1.99474	0.04836	**	41	-0.0014	-1.5453	0.12493		93	-0.0014	-1.5993	0.1124	
-10	0.00015	0.16777	0.86705		42	0.00049	0.55214	0.58189		94	0.00029	0.31847	0.75069	
-9	0.00039	0.44063	0.66028		43	-0.0008	-0.8842	0.37835		95	-0.0014	-1.5171	0.13189	
-8	-0.0019	-2.116	0.03643	**	44	0.00171	1.91256	0.05821	*	96	0.00046	0.51168	0.60982	
-7	-0.0014	-1.6137	0.10925		45	0.00074	0.82429	0.41142		97	-0.0008	-0.9154	0.36183	
-6	0.00073	0.83815	0.40363		46	0.00133	1.48026	0.14145		98	-0.0014	-1.5806	0.11661	
-5	0.00231	2.64839	0.00918	***	47	-0.0018	-2.0485	0.04271	**	99	-0.0002	-0.2679	0.78927	
-4	0.00123	1.40387	0.16296		48	-0.001	-1.0803	0.28221		100	0.00086	0.96077	0.33861	
-3	0.00257	2.93721	0.00398	***	49	-0.001	-1.1154	0.26691		101	-0.0007	-0.7515	0.45383	
-2	0.00287	3.28318	0.00135	***	50	-0.0016	-1.8548	0.0661	*	102	0.00011	0.12008	0.90462	
-1	0.00562	6.41919	2.9E-09	***	51	-0.0005	-0.5908	0.5558		103	-7E-05	-0.0778	0.93808	
0	0.00501	5.72432	7.9E-08	***	52	0.00049	0.55347	0.58098		104	-0.0003	-0.3073	0.75913	
1	0.00066	0.75687	0.45062		53	-0.0003	-0.3452	0.73053		105	0.00135	1.50211	0.13572	
2	0.00047	0.53987	0.5903		54	0.00215	2.4526	0.01563	**	106	0.00059	0.65946	0.51088	
3	-0.0003	-0.328	0.74345		55	-0.0004	-0.4746	0.63593		107	-0.0017	-1.8823	0.06224	*
4	-0.0013	-1.5131	0.13291		56	-0.001	-1.1688	0.24482		108	0.00102	1.14464	0.25466	
5	-0.0004	-0.4811	0.63135		57	0.00011	0.12452	0.90111		109	0.00061	0.6906	0.49116	
6	-0.0007	-0.8432	0.40082		58	-0.0012	-1.3132	0.19165		110	-0.0013	-1.5057	0.13479	
7	-0.0001	-0.1228	0.90248		59	-0.0014	-1.6178	0.10835		111	-0.0005	-0.5086	0.61197	
8	-0.0001	-0.1258	0.90011		60	0.00097	1.09289	0.27665		112	-0.0012	-1.3324	0.18528	
9	0.00014	0.16538	0.86892		61	-0.0003	-0.2837	0.77712		113	-0.0017	-1.9405	0.05468	*
10	-0.0004	-0.442	0.65929		62	-0.0006	-0.6535	0.51471		114	-0.0004	-0.485	0.62858	
11	0.00131	1.49967	0.13635		63	8.9E-05	0.10012	0.92042		115	0.00027	0.29832	0.76598	
12	0.00044	0.50789	0.61247		64	0.00078	0.88048	0.38038		116	0.00089	0.99418	0.32215	
13	-3E-05	-0.0294	0.97663		65	0.00141	1.59338	0.11373		117	0.00187	2.09511	0.03828	**
14	-0.0018	-2.081	0.03958	**	66	0.0015	1.6969	0.09233	*	118	-0.0007	-0.7532	0.45279	
15	-0.0003	-0.3027	0.76267		67	0.00021	0.23284	0.81628		119	-0.0003	-0.3088	0.75798	
16	2.8E-06	0.00315	0.99749		68	-0.0004	-0.4165	0.67782		120	-0.0002	-0.2547	0.79938	
17	-0.0024	-2.6914	0.00814	***	69	0.00169	1.9056	0.05911	*					
18	0.00067	0.76015	0.44867		70	0.00055	0.62238	0.53488						
19	0.00074	0.83789	0.40377		71	-0.0015	-1.7412	0.08423	*					
20	0.00073	0.82865	0.40896		72	-0.0004	-0.4915	0.62399						
21	-0.0004	-0.4047	0.68642		73	-0.0011	-1.2412	0.21698						
22	-0.0004	-0.4034	0.68737		74	-0.0006	-0.6916	0.49054						
23	3.1E-05	0.03505	0.9721		75	-0.0024	-2.6901	0.00817	***					
24	0.00066	0.73848	0.46168		76	-0.001	-1.1122	0.26831						
25	-0.0006	-0.6819	0.49663		77	-0.0002	-0.1941	0.84644						
26	0.00098	1.1182	0.26574		78	0.00069	0.77318	0.44095						
27	-0.0014	-1.6493	0.10173		79	0.00031	0.34587	0.73005						
28	7.6E-05	0.08711	0.93073		80	-0.0008	-0.9327	0.35287						
29	-0.0014	-1.5597	0.12148		81	0.00207	2.2888	0.02386	**					
30	-4E-05	-0.045	0.96416		82	-0.0016	-1.8134	0.07228	*					
31	-0.0003	-0.3383	0.73573		83	-0.0007	-0.8223	0.41258						

Table II: AAR for upgrade with entire sample

	AAR	T	p	star	t		AAR	T	p	star	t		AAR	T	p	star
-20	-0.0015	-1.0935	0.27636			32	-0.0009	-0.6845	0.49496			84	-0.0007	-0.5143	0.60801	
-19	-0.0007	-0.5004	0.61769			33	-0.0016	-1.2692	0.20685			85	0.00112	0.88086	0.38017	
-18	-0.0018	-1.3229	0.18842			34	0.00193	1.50349	0.13536			86	0.00151	1.19294	0.23527	
-17	-0.0003	-0.2204	0.82597			35	0.00085	0.65505	0.5137			87	0.00169	1.32822	0.18665	
-16	-0.002	-1.5002	0.13622			36	0.00108	0.84499	0.39981			88	0.00025	0.19765	0.84366	
-15	0.00155	1.14518	0.25443			37	0.00028	0.21511	0.83005			89	-0.0021	-1.6226	0.10732	
-14	0.00093	0.68814	0.49271			38	1.3E-05	0.00971	0.99227			90	-0.0033	-2.6158	0.01006	**
-13	0.00084	0.62086	0.53588			39	-0.0003	-0.2047	0.83813			91	-0.0022	-1.6931	0.09305	*
-12	0.00102	0.76897	0.44344			40	0.00097	0.75066	0.45434			92	-0.0002	-0.1584	0.87439	
-11	0.00115	0.86939	0.38638			41	0.00171	1.32853	0.18655			93	0.00109	0.85823	0.39249	
-10	-0.0011	-0.7943	0.4286			42	-0.0028	-2.1571	0.03301	**		94	-0.0009	-0.6923	0.4901	
-9	-8E-05	-0.0593	0.9528			43	0.00261	2.01405	0.04626	**		95	0.00032	0.24937	0.8035	
-8	0.00252	1.91308	0.05814	*		44	-0.0016	-1.2727	0.20559			96	-0.0013	-1.002	0.3184	
-7	0.00014	0.10912	0.91329			45	-0.0007	-0.5285	0.59817			97	0.00068	0.53173	0.5959	
-6	-0.0017	-1.2944	0.19802			46	0.00023	0.18171	0.85612			98	-0.0005	-0.3987	0.69086	
-5	-0.0002	-0.1194	0.90515			47	-0.0017	-1.3538	0.17838			99	0.00015	0.12011	0.9046	
-4	0.00045	0.3352	0.73806			48	-0.0012	-0.9554	0.34133			100	0.00017	0.13047	0.89641	
-3	0.0012	0.90619	0.36667			49	-0.0005	-0.4104	0.68224			101	0.00117	0.9148	0.36215	
-2	-0.0008	-0.6397	0.52363			50	1.9E-05	0.0151	0.98798			102	-0.0004	-0.2764	0.78274	
-1	-0.0027	-2.0396	0.04361	**		51	0.00193	1.51552	0.13229			103	0.00063	0.4972	0.61996	
0	-0.0035	-2.6161	0.01005	**		52	0.00027	0.21003	0.834			104	0.00098	0.7735	0.44076	
1	-0.0021	-1.553	0.12308			53	2.6E-05	0.02059	0.98361			105	0.00178	1.39787	0.16475	
2	0.00029	0.21869	0.82726			54	-8E-05	-0.0592	0.95292			106	0.00144	1.13308	0.25946	
3	-0.0007	-0.5056	0.61407			55	-0.002	-1.5625	0.12083			107	0.0006	0.4703	0.639	
4	0.00099	0.74537	0.45752			56	-0.0014	-1.1216	0.26429			108	-0.0002	-0.1508	0.88043	
5	0.00033	0.25045	0.80267			57	0.00034	0.26424	0.79205			109	0.00105	0.82565	0.41065	
6	-0.0017	-1.277	0.20409			58	1.1E-05	0.0089	0.99291			110	-0.003	-2.3905	0.01839	**
7	0.00071	0.54327	0.58796			59	-9E-05	-0.0685	0.94548			111	-0.0012	-0.9575	0.34025	
8	0.00042	0.31876	0.75046			60	0.00203	1.57457	0.11801			112	-0.0013	-0.9811	0.32853	
9	0.00186	1.41468	0.15977			61	-0.0005	-0.3951	0.69345			113	7.8E-05	0.05981	0.95241	
10	0.00143	1.09607	0.27526			62	0.00012	0.09023	0.92826			114	0.00194	1.52686	0.12945	
11	-0.0017	-1.3477	0.18032			63	0.00156	1.22343	0.22359			115	0.00046	0.3609	0.71881	
12	-8E-05	-0.0664	0.94717			64	0.0011	0.86664	0.38788			116	-0.0005	-0.3721	0.71051	
13	-0.0015	-1.2039	0.23101			65	0.00183	1.42987	0.15538			117	7.4E-05	0.0582	0.95369	
14	-0.0037	-2.8998	0.00445	***		66	0.00341	2.67001	0.00865	***		118	0.00084	0.65809	0.51175	
15	-0.0004	-0.3439	0.73153			67	-0.0004	-0.2812	0.77907			119	-0.001	-0.7447	0.4579	
16	0.00158	1.24723	0.21476			68	-0.0015	-1.1428	0.25542			120	0.00075	0.58389	0.5604	
17	-0.0006	-0.4914	0.62402			69	-0.0013	-1.0402	0.30036							
18	-0.0004	-0.3037	0.76191			70	-0.0015	-1.1506	0.25222							
19	0.0017	1.34174	0.18224			71	-0.0025	-1.9827	0.04971	**						
20	-0.0013	-1.0427	0.29919			72	-0.0015	-1.199	0.23291							
21	-0.002	-1.5426	0.12558			73	0.00179	1.40493	0.16265							
22	0.00046	0.36508	0.7157			74	6.8E-05	0.05344	0.95747							
23	0.00051	0.38724	0.69927			75	-0.0011	-0.8971	0.3715							
24	0.0019	1.49755	0.1369			76	-0.0029	-2.2466	0.02651	**						
25	0.00038	0.2959	0.76782			77	-0.0009	-0.7181	0.4741							
26	-0.0019	-1.4997	0.13634			78	-0.0004	-0.3321	0.7404							
27	-0.0018	-1.3958	0.16536			79	0.00039	0.30729	0.75916							
28	-0.0007	-0.5161	0.60671			80	0.00012	0.09487	0.92458							
29	-0.0017	-1.3353	0.18433			81	6.1E-05	0.04814	0.96169							
30	0.00025	0.19222	0.8479			82	0.00097	0.75611	0.45108							
31	-9E-06	-0.0071	0.99431			83	-0.001	-0.7591	0.4493							

Table III: AAR for downgrade with entire sample

t	AAR	T	p	star	t	AAR	T	p	star	t	AAR	T	p	star
-20	-0.002	-1.4369	0.15338		32	-0.0022	-1.5643	0.12041		84	0.00066	0.43541	0.66405	
-19	-0.0025	-1.7652	0.08009	*	33	0.00094	0.66477	0.50748		85	-0.0023	-1.4865	0.13979	
-18	-0.0007	-0.5134	0.6086		34	0.00011	0.07703	0.93873		86	0.00012	0.07396	0.94117	
-17	0.00105	0.74288	0.45902		35	0.00042	0.29379	0.76943		87	0.0029	1.87324	0.06349	*
-16	-0.0002	-0.1439	0.88581		36	0.00234	1.64045	0.10355		88	0.00101	0.65878	0.51131	
-15	-0.0008	-0.5538	0.58078		37	-6E-05	-0.039	0.96896		89	0.00021	0.13571	0.89228	
-14	-0.001	-0.7392	0.46124		38	-0.0011	-0.7598	0.44891		90	-0.0038	-2.5179	0.01313	**
-13	0.00109	0.77055	0.4425		39	0.00264	1.85103	0.06665	*	91	-0.002	-1.2908	0.19928	
-12	-0.0002	-0.1358	0.89219		40	-5E-05	-0.0342	0.97276		92	-0.0028	-1.8291	0.0699	*
-11	0.00368	2.60347	0.0104	**	41	-0.0029	-2.0468	0.04288	**	93	-0.0002	-0.1523	0.87921	
-10	0.00039	0.2724	0.78579		42	-0.0002	-0.1379	0.89056		94	-0.0002	-0.1506	0.88052	
-9	9.4E-05	0.06632	0.94723		43	-0.001	-0.7119	0.47791		95	-0.0009	-0.564	0.57384	
-8	-0.0025	-1.7759	0.0783	*	44	0.00099	0.68368	0.49551		96	-0.0014	-0.8989	0.37051	
-7	0.00052	0.3677	0.71375		45	0.00237	1.63404	0.10489		97	0.00151	1.00454	0.31716	
-6	0.00105	0.73876	0.46151		46	-0.0007	-0.5124	0.60932		98	-0.0006	-0.3779	0.7062	
-5	0.00488	3.43852	0.00081	***	47	-0.0023	-1.6052	0.11109		99	0.00181	1.19075	0.23612	
-4	0.00147	1.03999	0.30045		48	-0.0007	-0.4609	0.64572		100	0.00112	0.73065	0.46643	
-3	0.00428	3.01697	0.00312	***	49	-0.0003	-0.1877	0.85143		101	0.00121	0.79553	0.42789	
-2	0.00124	0.87415	0.3838		50	0.00061	0.4271	0.67008		102	-0.0007	-0.4491	0.65421	
-1	0.00499	3.51834	0.00062	***	51	0.00077	0.53682	0.5924		103	-0.0023	-1.5238	0.13021	
0	0.00416	2.93651	0.00399	***	52	-0.0007	-0.4648	0.64293		104	0.00206	1.34591	0.18089	
1	6.9E-05	0.04897	0.96103		53	-0.0029	-2.0295	0.04464	**	105	0.00069	0.45153	0.65243	
2	-0.0007	-0.5015	0.61698		54	0.00349	2.424	0.01686	**	106	0.00069	0.45589	0.6493	
3	-0.0011	-0.7584	0.44968		55	-0.001	-0.7003	0.48509		107	-0.0014	-0.906	0.36679	
4	-0.0027	-1.9289	0.05612	*	56	-0.0002	-0.1376	0.89081		108	0.00153	1.02174	0.30898	
5	0.00033	0.2355	0.81422		57	0.0013	0.90846	0.36547		109	0.00132	0.88916	0.37571	
6	-0.0013	-0.918	0.36046		58	-0.0015	-1.0738	0.28508		110	-0.0032	-2.1555	0.03314	**
7	0.00044	0.30925	0.75767		59	-0.0023	-1.606	0.11093		111	-0.0035	-2.3667	0.01956	**
8	0.00198	1.39724	0.16494		60	-2E-05	-0.0106	0.99154		112	-0.0003	-0.1949	0.84579	
9	-0.0012	-0.867	0.38766		61	-0.0006	-0.4261	0.67079		113	0.00143	0.96464	0.33668	
10	0.00133	0.94165	0.34828		62	-0.0008	-0.579	0.56368		114	-0.0034	-2.2914	0.0237	**
11	0.0015	1.06022	0.29119		63	0.00055	0.37766	0.70635		115	-0.0008	-0.5465	0.58573	
12	0.00137	0.96717	0.33542		64	0.00022	0.15376	0.87806		116	-0.0008	-0.5339	0.59443	
13	0.00231	1.63269	0.10518		65	0.00057	0.39118	0.69636		117	0.00352	2.35321	0.02025	**
14	-0.0014	-0.986	0.32612		66	-0.0006	-0.4403	0.66049		118	-0.0007	-0.4736	0.63662	
15	-0.0031	-2.2054	0.02935	**	67	-0.0002	-0.1357	0.89231		119	7E-05	0.04587	0.96349	
16	-0.001	-0.7119	0.47791		68	-0.0005	-0.3502	0.72678		120	-0.0024	-1.5156	0.13226	
17	-0.002	-1.4277	0.15601		69	-1E-05	-0.0082	0.99344						
18	0.00123	0.86975	0.38619		70	0.00057	0.39258	0.69534						
19	0.00219	1.5422	0.12568		71	0.00058	0.40183	0.68853						
20	0.0002	0.14478	0.88513		72	0.00095	0.66077	0.51004						
21	0.00096	0.67637	0.50012		73	0.00206	1.41652	0.15923						
22	-0.0001	-0.0804	0.93602		74	-0.0012	-0.8009	0.42479						
23	-2E-05	-0.0127	0.98985		75	-0.0011	-0.748	0.45596						
24	0.00066	0.46885	0.64003		76	-0.002	-1.4028	0.16329						
25	-0.0038	-2.706	0.00781	***	77	0.00062	0.42368	0.67256						
26	-0.0004	-0.2516	0.80175		78	0.00028	0.18989	0.84972						
27	0.00085	0.60032	0.54944		79	0.00225	1.5186	0.13152						
28	-0.0011	-0.7955	0.42788		80	0.00052	0.34832	0.72822						
29	-0.0013	-0.9342	0.35211		81	0.00115	0.75457	0.452						
30	0.00053	0.37312	0.70972		82	-0.003	-1.9429	0.05439	*					
31	0.00314	2.20985	0.02903	**	83	0.00017	0.11322	0.91005						

Table IV: AAR for upgrade for sample without firm events

t	AAR	T	p	star	t	AAR	T	p	star	t	AAR	T	p	star
-20	-0.0028	-1.1823	0.23944		32	0.00184	0.99314	0.32266		84	-0.0044	-2.3675	0.01952	**
-19	0.00032	0.13491	0.89291		33	-0.0011	-0.5783	0.56417		85	0.00324	1.7393	0.08457	*
-18	-0.0013	-0.5645	0.57351		34	0.00162	0.86908	0.38655		86	0.00227	1.23128	0.22065	
-17	-0.0006	-0.2592	0.79593		35	-0.0012	-0.6353	0.52648		87	0.00308	1.66465	0.09861	*
-16	-0.0008	-0.3368	0.73684		36	-0.0008	-0.4525	0.65176		88	0.0045	2.42553	0.01679	**
-15	0.00636	2.67372	0.00856	***	37	-0.0015	-0.8234	0.41192		89	-0.0032	-1.7392	0.08459	*
-14	0.00124	0.51811	0.60535		38	0.00054	0.29216	0.77067		90	-0.0028	-1.4817	0.14107	
-13	0.00542	2.3039	0.02296	**	39	0.00127	0.67927	0.49828		91	-0.0026	-1.4051	0.1626	
-12	-0.001	-0.4404	0.66043		40	0.0021	1.11468	0.26724		92	-0.0013	-0.7126	0.47748	
-11	0.00287	1.29738	0.19701		41	0.00099	0.5309	0.59648		93	0.00105	0.56219	0.57504	
-10	-0.0027	-1.2131	0.22748		42	-0.0056	-2.9927	0.00336	***	94	8.9E-05	0.04746	0.96223	
-9	-0.0012	-0.5272	0.59904		43	0.00497	2.67635	0.00849	***	95	0.00118	0.6303	0.5297	
-8	0.00062	0.28289	0.77775		44	-0.0015	-0.8159	0.41619		96	-0.0044	-2.3686	0.01947	**
-7	-0.0003	-0.1434	0.88626		45	0.0024	1.28882	0.19996		97	0.0005	0.26375	0.79243	
-6	-0.0016	-0.7523	0.45334		46	-0.003	-1.6019	0.11184		98	0.00131	0.69571	0.48797	
-5	0.0015	0.64997	0.51696		47	-0.0018	-0.9821	0.32804		99	-4E-05	-0.0211	0.98317	
-4	0.00048	0.2089	0.83488		48	-0.0024	-1.3025	0.19526		100	0.00053	0.28538	0.77585	
-3	0.00365	1.63864	0.10393		49	-0.0004	-0.1926	0.84761		101	-0.0025	-1.305	0.1944	
-2	-0.0019	-0.8528	0.3955		50	-0.0003	-0.158	0.87473		102	-0.0017	-0.8813	0.37992	
-1	-0.0022	-0.9833	0.32746		51	0.00368	1.97306	0.05081	*	103	-0.0017	-0.8832	0.3789	
0	0.00423	1.90559	0.05912	*	52	-0.0025	-1.322	0.1887		104	0.00203	1.08425	0.28045	
1	-0.0006	-0.2607	0.79481		53	-0.0021	-1.1131	0.26792		105	0.00239	1.27397	0.20516	
2	0.00032	0.14538	0.88465		54	0.00077	0.4138	0.67977		106	0.00197	1.04505	0.29812	
3	0.00159	0.72024	0.47279		55	-0.0042	-2.2307	0.02757	**	107	0.00152	0.81096	0.41901	
4	-5E-05	-0.0226	0.98199		56	-0.0006	-0.3113	0.75615		108	-0.0029	-1.5579	0.12192	
5	-0.0017	-0.7771	0.43865		57	3.6E-05	0.01889	0.98496		109	0.00058	0.31085	0.75646	
6	-0.0009	-0.422	0.67377		58	0.00045	0.23869	0.81175		110	-0.0011	-0.6008	0.54909	
7	0.00092	0.42952	0.66832		59	-0.0032	-1.7055	0.0907	*	111	0.00118	0.62305	0.53444	
8	0.00104	0.48622	0.62771		60	0.00076	0.40613	0.68538		112	-0.0013	-0.684	0.49529	
9	0.00514	2.39657	0.01811	**	61	-0.0031	-1.637	0.10427		113	0.00019	0.09955	0.92087	
10	0.00513	2.4571	0.01545	**	62	0.00073	0.39115	0.69639		114	-0.0013	-0.6865	0.49371	
11	-0.0018	-0.9827	0.32773		63	0.003	1.60865	0.11034		115	-0.0013	-0.6995	0.48562	
12	0.0019	1.02775	0.30615		64	0.00045	0.24305	0.80839		116	-0.0029	-1.5043	0.13516	
13	-0.0038	-2.0579	0.04179	**	65	0.00012	0.0655	0.94789		117	0.00017	0.0894	0.92892	
14	-0.0056	-3.0506	0.00282	***	66	0.00449	2.39832	0.01802	**	118	-0.0011	-0.5972	0.55149	
15	0.00141	0.7635	0.44668		67	-0.0015	-0.8157	0.41629		119	0.00272	1.4213	0.15784	
16	-0.0002	-0.122	0.90309		68	-0.0021	-1.1126	0.26813		120	-0.0009	-0.4546	0.65024	
17	-0.0005	-0.267	0.78991		69	0.00106	0.56824	0.57094						
18	0.00161	0.87529	0.38318		70	0.00159	0.85159	0.39615						
19	-3E-05	-0.0186	0.98522		71	0.00109	0.5822	0.56153						
20	0.00086	0.46842	0.64034		72	-0.0021	-1.1224	0.26395						
21	-0.0035	-1.8728	0.06354	*	73	0.00248	1.327	0.18705						
22	-0.0023	-1.27	0.20658		74	0.00222	1.18996	0.23643						
23	-0.0011	-0.5979	0.55106		75	0.0005	0.26438	0.79194						
24	-0.0009	-0.5006	0.61757		76	-0.0055	-2.9264	0.00411	***					
25	0.00256	1.38218	0.1695		77	0.00126	0.66985	0.50425						
26	-0.0028	-1.5107	0.13351		78	0.00052	0.2741	0.78449						
27	-0.0019	-1.0234	0.30817		79	-0.001	-0.5565	0.57892						
28	0.00163	0.87904	0.38115		80	0.00015	0.07988	0.93647						
29	-0.0044	-2.3666	0.01957	**	81	0.00024	0.13101	0.89599						
30	0.00133	0.71465	0.47623		82	-0.0019	-1.0211	0.30929						
31	-0.0026	-1.377	0.1711		83	-0.0026	-1.3992	0.16435						

Table V: AAR for downgrade for sample without firm events

t	AAR	T	p	star	t	AAR	T	p	star	t	AAR	T	p	star
-20	-0.003	-0.7289	0.46748		32	-0.0083	-2.0379	0.04378	**	84	0.00791	1.94596	0.05402	*
-19	0.00167	0.41173	0.68128		33	0.00728	1.79095	0.07584	*	85	-0.0017	-0.4112	0.68168	
-18	0.00315	0.77657	0.43895		34	-0.0026	-0.6387	0.52427		86	-0.0046	-1.1409	0.2562	
-17	0.00575	1.41416	0.15993		35	0.00865	2.1285	0.03536	**	87	-0.0013	-0.328	0.74349	
-16	-0.0062	-1.5267	0.12948		36	0.00201	0.49386	0.62232		88	-0.0027	-0.6632	0.50849	
-15	0.00564	1.3887	0.16752		37	-0.0125	-3.088	0.00251	***	89	0.00031	0.07601	0.93954	
-14	0.00132	0.32577	0.74517		38	-0.001	-0.2369	0.81317		90	0.00058	0.14276	0.88672	
-13	0.00447	1.1009	0.27316		39	-0.0003	-0.0642	0.94888		91	0.00433	1.06235	0.29023	
-12	-0.0048	-1.1854	0.23821		40	-0.0043	-1.0613	0.29072		92	-0.0027	-0.6522	0.5155	
-11	-0.0015	-0.3769	0.70691		41	-0.0014	-0.3404	0.73415		93	0.00767	1.8854	0.06181	*
-10	0.00303	0.74539	0.4575		42	0.00266	0.65594	0.51313		94	0.01268	3.11488	0.00231	***
-9	0.00653	1.60783	0.11052		43	-0.0076	-1.8767	0.06301	*	95	-0.0119	-2.912	0.00429	***
-8	0.00454	1.11727	0.26613		44	0.00057	0.1413	0.88788		96	0.00652	1.60259	0.11168	
-7	-0.0042	-1.0452	0.29805		45	-0.0053	-1.2983	0.19671		97	0.00012	0.02907	0.97686	
-6	-0.002	-0.4977	0.61963		46	-0.0017	-0.4072	0.68463		98	0.00082	0.20299	0.83949	
-5	-0.0005	-0.1327	0.89464		47	0.00952	2.34113	0.02089	**	99	0.01671	4.10387	7.5E-05	***
-4	0.00962	2.36728	0.01953	**	48	0.00586	1.44335	0.15155		100	0.00218	0.53511	0.59357	
-3	0.01019	2.50928	0.01344	**	49	0.00278	0.68569	0.49424		101	0.00578	1.41951	0.15836	
-2	0.01358	3.34185	0.00111	***	50	0.00118	0.29167	0.77105		102	0.01451	3.57075	0.00051	***
-1	0.00853	2.09956	0.03788	**	51	-0.0004	-0.0986	0.92165		103	-0.0009	-0.2206	0.8258	
0	0.01307	3.21279	0.00169	***	52	0.00028	0.06835	0.94563		104	-0.0007	-0.1705	0.86493	
1	0.00259	0.63605	0.52596		53	0.00579	1.42608	0.15646		105	0.00252	0.6181	0.53769	
2	0.00085	0.21004	0.834		54	-0.0023	-0.5647	0.57335		106	0.005	1.22735	0.22211	
3	-0.0073	-1.8066	0.07335	*	55	0.0018	0.44249	0.65894		107	0.00372	0.91244	0.36338	
4	-0.0082	-2.0089	0.04681	**	56	-0.0004	-0.091	0.92762		108	0.01533	3.76162	0.00026	***
5	0.00227	0.55875	0.57739		57	0.00949	2.33679	0.02112	**	109	0.0078	1.91428	0.05799	*
6	-0.0002	-0.061	0.95145		58	-0.0033	-0.8074	0.42107		110	0.0144	3.52231	0.00061	***
7	0.00292	0.7182	0.47404		59	-0.007	-1.7115	0.0896	*	111	0.0001	0.02482	0.98024	
8	0.00572	1.40916	0.1614		60	0.00799	1.96738	0.05147	*	112	0.00178	0.43267	0.66604	
9	0.01486	3.65645	0.00038	***	61	-0.0063	-1.544	0.12525		113	-0.0043	-1.0391	0.30085	
10	-0.0037	-0.9017	0.36905		62	-0.0037	-0.9015	0.36913		114	-0.0107	-2.6045	0.01037	**
11	0.0144	3.54536	0.00056	***	63	0.00263	0.64818	0.51812		115	-0.0082	-2.0004	0.04773	**
12	0.00047	0.11487	0.90874		64	0.01001	2.46335	0.0152	**	116	0.00346	0.84175	0.40162	
13	-0.0111	-2.7303	0.00729	***	65	0.00039	0.09537	0.92418		117	0.00338	0.82473	0.41118	
14	0.01797	4.42574	2.1E-05	***	66	-0.0044	-1.0728	0.28551		118	0.01752	4.28749	3.7E-05	***
15	-0.0079	-1.9494	0.0536	*	67	0.00655	1.61124	0.10978		119	0.00729	1.78261	0.0772	*
16	-0.0014	-0.3351	0.7381		68	-0.0003	-0.0633	0.94961		120	-0.0082	-1.9967	0.04814	**
17	0.00197	0.48586	0.62796		69	-0.002	-0.4909	0.62443						
18	-0.0073	-1.7957	0.07508	*	70	-0.0014	-0.3383	0.73571						
19	0.00042	0.10396	0.91737		71	-0.0036	-0.8938	0.37321						
20	0.00134	0.32997	0.742		72	0.0114	2.80619	0.00586	***					
21	0.00375	0.92317	0.35779		73	0.00857	2.1095	0.037	**					
22	0.00612	1.50554	0.13483		74	0.00248	0.61142	0.54209						
23	-0.001	-0.2378	0.81245		75	-0.0049	-1.2122	0.22783						
24	0.0048	1.18082	0.24003		76	-0.0051	-1.2618	0.20949						
25	-0.0017	-0.4198	0.67539		77	-0.0088	-2.1629	0.03255	**					
26	-0.0013	-0.3268	0.74436		78	-0.0034	-0.8331	0.40644						
27	0.00261	0.64259	0.52173		79	0.006	1.47546	0.14273						
28	0.00224	0.55176	0.58215		80	0.00198	0.48654	0.62748						
29	0.00111	0.27203	0.78607		81	0.01	2.46222	0.01524	**					
30	-0.0104	-2.5687	0.01144	**	82	-0.0066	-1.6204	0.1078						
31	0.00331	0.81463	0.41691		83	0.00885	2.18073	0.03117	**					

Table VI: AAR for upgrade in the bull market

t	AAR	T	p	star	t	AAR	T	p	star	t	AAR	T	p	star
-20	-0.0063	-0.9755	0.33127		32	-0.0061	-0.9271	0.35575		84	-0.0124	-1.8665	0.06443	*
-19	-0.0012	-0.1851	0.85344		33	-0.0092	-1.4017	0.16362		85	0.00606	0.91327	0.36295	
-18	-0.0034	-0.5237	0.60146		34	-0.0054	-0.824	0.41157		86	0.00101	0.15625	0.8761	
-17	0.006	0.93559	0.35138		35	-0.0107	-1.6273	0.10633		87	0.0093	1.41871	0.1586	
-16	-0.0063	-0.9778	0.33016		36	-0.0138	-2.0897	0.03878	**	88	0.01648	2.45553	0.01551	**
-15	0.01129	1.75432	0.08195	*	37	0.00165	0.24195	0.80924		89	-0.0125	-1.836	0.06886	*
-14	-0.0178	-2.7634	0.00663	***	38	-0.012	-1.7984	0.07465	*	90	-0.0091	-1.2699	0.2066	
-13	0.00757	1.17492	0.24237		39	0.00486	0.72335	0.47088		91	-0.0169	-2.3798	0.01891	**
-12	-0.0058	-0.9075	0.36598		40	-0.0002	-0.0331	0.97369		92	-0.0164	-2.3624	0.01978	**
-11	0.00219	0.34109	0.73364		41	0.01208	1.81041	0.07276	*	93	0.01021	1.48939	0.13903	
-10	-0.0064	-0.991	0.32369		42	-0.0105	-1.5912	0.11421		94	-0.0124	-1.7832	0.0771	*
-9	0.00316	0.48964	0.62529		43	0.01615	2.42743	0.0167	**	95	-0.011	-1.5948	0.1134	
-8	0.01192	1.85537	0.06602	*	44	-0.0066	-0.9834	0.3274		96	-0.0047	-0.675	0.50099	
-7	-0.0054	-0.8465	0.39895		45	0.00543	0.80996	0.41958		97	0.00451	0.63984	0.52351	
-6	-0.0138	-2.1277	0.03542	**	46	-0.0021	-0.316	0.75258		98	0.00221	0.30759	0.75893	
-5	-0.001	-0.1583	0.87451		47	-0.0062	-0.9426	0.34777		99	-0.0021	-0.3049	0.76096	
-4	0.00991	1.52443	0.13006		48	-0.0114	-1.718	0.0884	*	100	-0.0007	-0.1028	0.91827	
-3	0.01789	2.77127	0.00648	***	49	0.0003	0.04509	0.96411		101	0.00721	1.02607	0.30694	
-2	0.00394	0.61153	0.54202		50	-0.0048	-0.7208	0.47248		102	-0.0028	-0.395	0.69358	
-1	0.00607	0.94046	0.34889		51	0.00421	0.6389	0.52412		103	0.00281	0.39037	0.69696	
0	-0.0051	-0.7864	0.43319		52	-0.0212	-3.2035	0.00174	***	104	-0.0017	-0.2365	0.81349	
1	-0.0072	-1.1154	0.26691		53	-0.0023	-0.3341	0.73886		105	-0.0025	-0.3474	0.72887	
2	0.00322	0.4997	0.61821		54	0.00369	0.55649	0.57892		106	0.01852	2.59422	0.01067	**
3	-0.0048	-0.7519	0.45358		55	-0.0068	-1.0115	0.31382		107	0.00042	0.06029	0.95203	
4	0.00054	0.08191	0.93485		56	-0.0013	-0.1982	0.84324		108	-0.0081	-1.167	0.24554	
5	-0.0034	-0.5207	0.60352		57	-0.0005	-0.0744	0.94084		109	0.00758	1.074	0.285	
6	0.01333	2.05996	0.04158	**	58	0.00728	1.08746	0.27903		110	0.00931	1.30467	0.19452	
7	0.00185	0.28287	0.77777		59	0.00313	0.46775	0.64082		111	0.01116	1.5515	0.12344	
8	0.00281	0.43338	0.66552		60	-0.0071	-1.039	0.3009		112	-0.0045	-0.6319	0.52867	
9	0.01851	2.82754	0.00551	***	61	-0.0008	-0.1165	0.90748		113	-0.0066	-0.9083	0.36556	
10	0.02694	4.18412	5.5E-05	***	62	-0.0017	-0.2496	0.80331		114	0.00505	0.71224	0.47771	
11	-0.0018	-0.2766	0.78254		63	-0.0032	-0.4803	0.63191		115	0.00937	1.33322	0.18501	
12	-0.012	-1.8447	0.06757	*	64	0.015	2.25459	0.02599	**	116	0.00651	0.94495	0.3466	
13	-0.0042	-0.6523	0.51548		65	0.0272	4.00441	0.00011	***	117	0.005	0.7259	0.46933	
14	-0.004	-0.6158	0.53922		66	0.00505	0.74997	0.45475		118	-0.007	-1.0238	0.30803	
15	-0.0033	-0.5046	0.6148		67	0.00803	1.1985	0.2331		119	-1E-05	-0.0015	0.99883	
16	-0.002	-0.3048	0.76108		68	-0.0094	-1.4184	0.15869		120	0.00876	1.28721	0.20052	
17	0.01244	1.92791	0.05625	*	69	-0.0023	-0.3509	0.72627						
18	-0.0052	-0.8022	0.42405		70	0.01878	2.85932	0.00501	***					
19	-0.0036	-0.5519	0.58202		71	-0.0069	-1.0477	0.2969						
20	-4E-05	-0.0056	0.99557		72	-0.0001	-0.0155	0.9877						
21	-0.0131	-2.0333	0.04424	**	73	0.00949	1.43316	0.15443						
22	-0.0148	-2.2974	0.02334	**	74	0.0129	1.96252	0.05204	*					
23	-0.0021	-0.325	0.74577		75	0.0111	1.69131	0.0934	*					
24	-0.0014	-0.2109	0.83333		76	-0.0062	-0.9288	0.35489						
25	0.00636	0.96383	0.33709		77	-0.0028	-0.4315	0.6669						
26	-0.0071	-1.0886	0.27854		78	-0.0095	-1.387	0.16803						
27	0.00572	0.87256	0.38466		79	-0.0085	-1.2971	0.19709						
28	0.0135	2.05586	0.04198	**	80	-0.0011	-0.1627	0.87106						
29	-0.0233	-3.5624	0.00053	***	81	-0.0008	-0.1242	0.9014						
30	0.00609	0.92027	0.3593		82	0.01557	2.34627	0.02062	**					
31	-0.0093	-1.4244	0.15695		83	0.00539	0.81576	0.41627						

Table VII: AAR for downgrade in the bull market

t	AAR	T	p	star	t	AAR	T	p	star	t	AAR	T	p	star
-20	-0.0047	-0.7854	0.43376		32	0.00304	0.50234	0.61636		84	0.00634	0.83305	0.40649	
-19	-0.0102	-1.6957	0.09255	*	33	0.00057	0.0954	0.92416		85	0.00199	0.25614	0.79829	
-18	-0.0013	-0.2126	0.83197		34	-0.0079	-1.3024	0.19528		86	0.01074	1.33682	0.18383	
-17	0.00356	0.59321	0.55416		35	-0.0027	-0.4345	0.6647		87	0.03442	4.36824	2.7E-05	***
-16	0.00041	0.06793	0.94596		36	0.02458	4.00213	0.00011	***	88	-0.0013	-0.1661	0.86834	
-15	-0.0036	-0.5889	0.55705		37	0.01174	1.94095	0.05463	*	89	-0.0066	-0.8825	0.37928	
-14	-0.0132	-2.2037	0.02947	**	38	0.00194	0.31985	0.74964		90	-0.002	-0.2651	0.79137	
-13	0.00903	1.48677	0.13972		39	0.00779	1.262	0.20942		91	-0.0101	-1.3299	0.1861	
-12	-0.0019	-0.3193	0.75006		40	-0.0002	-0.0354	0.97185		92	-0.0034	-0.4554	0.64963	
-11	0.001	0.16654	0.86801		41	-0.0061	-0.9945	0.32198		93	0.01116	1.49399	0.13783	
-10	0.0077	1.27565	0.20457		42	-0.004	-0.6377	0.52487		94	-0.0076	-0.9921	0.32315	
-9	0.00336	0.55124	0.58251		43	-0.0125	-1.9575	0.05263	*	95	0.00044	0.0592	0.95289	
-8	-0.0092	-1.5111	0.13343		44	-0.013	-2.0034	0.04741	**	96	-0.0004	-0.0521	0.95853	
-7	-0.0086	-1.4416	0.15205		45	0.01516	2.34283	0.0208	**	97	0.00846	1.148	0.25327	
-6	0.0092	1.52063	0.13101		46	0.00035	0.05407	0.95697		98	-0.0037	-0.5139	0.60831	
-5	0.00627	1.03845	0.30117		47	-0.0117	-1.7464	0.08332	*	99	0.00314	0.4149	0.67897	
-4	0.00088	0.14705	0.88334		48	1.5E-05	0.00229	0.99818		100	0.00383	0.502	0.6166	
-3	0.00099	0.1642	0.86985		49	0.00669	1.04745	0.29702		101	0.00082	0.10744	0.91462	
-2	5.9E-05	0.00987	0.99214		50	-0.0019	-0.3023	0.76295		102	0.00476	0.62277	0.53463	
-1	0.00477	0.78968	0.43128		51	-0.0011	-0.1746	0.86168		103	-0.0146	-1.913	0.05815	*
0	0.00048	0.08039	0.93606		52	-0.0098	-1.5347	0.12752		104	0.00501	0.64365	0.52104	
1	0.00435	0.72451	0.47017		53	-0.0068	-1.0478	0.29687		105	0.0129	1.69481	0.09273	*
2	-0.0099	-1.6541	0.10074		54	0.01194	1.89891	0.06	*	106	0.00708	0.94072	0.34875	
3	-0.0086	-1.428	0.15591		55	0.00218	0.34759	0.72876		107	-0.0016	-0.2137	0.83117	
4	-0.0094	-1.5584	0.12181		56	0.00812	1.29357	0.19832		108	0.00511	0.69938	0.48568	
5	-0.0046	-0.759	0.44937		57	-0.0033	-0.5265	0.59951		109	-0.0016	-0.2249	0.82244	
6	-0.0002	-0.0378	0.96989		58	-0.0112	-1.7938	0.07538	*	110	-0.0088	-1.2368	0.2186	
7	0.00228	0.37956	0.70495		59	-0.0071	-1.1377	0.25753		111	-0.0048	-0.6654	0.50711	
8	0.00218	0.36448	0.71615		60	-0.002	-0.3057	0.76034		112	0.00256	0.35877	0.7204	
9	-0.0026	-0.4368	0.66302		61	-0.0065	-0.9944	0.32206		113	0.01065	1.51555	0.13229	
10	-0.0009	-0.1429	0.88664		62	-0.0054	-0.8368	0.40436		114	-0.0058	-0.8377	0.40388	
11	-0.0116	-1.9444	0.0542	*	63	0.00647	0.97695	0.33058		115	-0.0069	-0.9512	0.34345	
12	0.00387	0.64442	0.52054		64	0.00206	0.30983	0.75723		116	-0.0004	-0.0528	0.95794	
13	0.00754	1.25784	0.21091		65	-0.0003	-0.0478	0.96192		117	0.00692	0.95422	0.34191	
14	-0.0126	-2.1068	0.03723	**	66	-0.0032	-0.4984	0.61915		118	-0.0092	-1.2473	0.21475	
15	-0.0061	-1.0165	0.31147		67	0.00746	1.14571	0.25421		119	-0.0025	-0.3297	0.74222	
16	-0.0023	-0.3785	0.70573		68	0.0006	0.09181	0.927		120	-0.0012	-0.1444	0.88547	
17	-0.0033	-0.5429	0.58823		69	-0.0008	-0.1169	0.90711						
18	0.004	0.66871	0.50497		70	-0.0086	-1.3284	0.18658						
19	0.00888	1.47782	0.1421		71	-5E-05	-0.0074	0.99412						
20	-0.0043	-0.7099	0.47916		72	-0.0024	-0.3762	0.70743						
21	-0.0003	-0.0493	0.96077		73	0.00157	0.24193	0.80925						
22	0.00362	0.6024	0.54806		74	-0.0063	-0.9684	0.33482						
23	-0.0111	-1.849	0.06694	*	75	-0.003	-0.4563	0.649						
24	0.00691	1.15203	0.25162		76	-0.0033	-0.4849	0.62864						
25	-0.0109	-1.8128	0.07238	*	77	-0.0112	-1.6894	0.09376	*					
26	-0.0027	-0.4574	0.64821		78	0.00173	0.25182	0.80162						
27	0.0037	0.616	0.53907		79	0.0079	1.11824	0.26572						
28	-0.0068	-1.128	0.26158		80	-0.0012	-0.1717	0.86396						
29	-0.0021	-0.3435	0.73181		81	0.00636	0.82734	0.4097						
30	0.00618	1.02869	0.30571		82	-0.0092	-1.1816	0.23973						
31	0.00881	1.46028	0.14685		83	0.01004	1.27983	0.20309						

Table VIII: AAR for upgrade in the bear market

t	AAR	T	p	star	t	AAR	T	p	star	t	AAR	T	p	star
-20	0.00109	0.03324	0.97354		32	-0.0007	-0.0537	0.95725		84	-0.0055	-0.4217	0.67397	
-19	-0.0004	-0.0119	0.99053		33	0.02425	1.87114	0.06378	*	85	-0.0047	-0.3591	0.72016	
-18	-0.0022	-0.0724	0.94238		34	0.00804	0.61999	0.53645		86	-0.0024	-0.1863	0.85256	
-17	-0.0009	-0.0273	0.97829		35	0.01148	0.88268	0.37919		87	-0.007	-0.5389	0.59093	
-16	-0.0034	-0.1062	0.91563		36	-0.0042	-0.325	0.74576		88	-0.0036	-0.2801	0.77985	
-15	-0.0023	-0.0715	0.9431		37	-0.0111	-0.854	0.39483		89	0.00382	0.29454	0.76886	
-14	0.00214	0.06764	0.94618		38	-0.004	-0.304	0.76166		90	-0.0113	-0.8684	0.38692	
-13	0.00488	0.15404	0.87784		39	0.01462	1.11969	0.2651		91	-0.0034	-0.2593	0.79584	
-12	0.00121	0.04336	0.96548		40	0.0098	0.73965	0.46097		92	-0.0084	-0.6497	0.51715	
-11	0.00373	0.13467	0.8931		41	0.02097	1.61861	0.10818		93	-0.0063	-0.4888	0.62587	
-10	-0.0047	-0.174	0.86216		42	-0.0183	-1.4163	0.15931		94	0.00024	0.01823	0.98549	
-9	-0.0063	-0.2373	0.81281		43	-0.0073	-0.5655	0.5728		95	0.02005	1.54366	0.12533	
-8	-0.0076	-0.2867	0.77487		44	-0.021	-1.6248	0.10685		96	0.00118	0.09065	0.92793	
-7	-0.0033	-0.124	0.90153		45	0.00119	0.09147	0.92727		97	-0.0098	-0.7583	0.44975	
-6	0.00446	0.16679	0.86782		46	-0.0051	-0.3941	0.69425		98	0.00396	0.30513	0.7608	
-5	0.00582	0.18931	0.85017		47	-0.0164	-1.2661	0.20795		99	0.01763	1.36063	0.1762	
-4	0.00745	0.24494	0.80692		48	-0.0108	-0.833	0.4065		100	0.00032	0.02498	0.98011	
-3	-0.0081	-0.2872	0.7745		49	-0.0058	-0.4477	0.65521		101	0.01422	1.09722	0.27476	
-2	0.00368	0.12918	0.89743		50	-0.0069	-0.5303	0.59691		102	-0.0019	-0.1473	0.88315	
-1	0.00264	0.09455	0.92484		51	-0.0051	-0.396	0.69278		103	-0.0081	-0.6239	0.53387	
0	0.00323	0.11665	0.90733		52	0.0194	1.49715	0.137		104	0.01725	1.32786	0.18677	
1	-0.0096	-0.3399	0.73456		53	-0.0209	-1.61	0.11004		105	-0.0008	-0.0624	0.95038	
2	0.01035	0.38291	0.70247		54	0.00328	0.25338	0.80041		106	-0.0159	-1.2255	0.22281	
3	-0.0026	-0.0938	0.92539		55	-0.0071	-0.5513	0.58244		107	-0.0012	-0.093	0.92605	
4	0.00324	0.11376	0.90962		56	-0.0064	-0.4897	0.62523		108	-0.018	-1.3888	0.16749	
5	-0.01	-0.3748	0.70845		57	-0.0012	-0.0958	0.92381		109	-0.0129	-0.9927	0.32286	
6	-0.003	-0.1147	0.9089		58	0.00502	0.38709	0.69938		110	0.00778	0.5985	0.55064	
7	-0.0053	-0.209	0.83477		59	-0.0099	-0.7653	0.4456		111	0.0005	0.0388	0.96911	
8	-0.0026	-0.102	0.91894		60	-0.0003	-0.0204	0.98376		112	-0.012	-0.9206	0.35914	
9	0.00409	0.16153	0.87195		61	2.5E-05	0.00195	0.99845		113	0.01217	0.93334	0.35253	
10	-0.006	-0.257	0.79762		62	0.00385	0.29612	0.76765		114	-0.0117	-0.9064	0.36653	
11	-0.0334	-2.5684	0.01145	**	63	-0.007	-0.5409	0.58957		115	-0.0125	-0.963	0.33748	
12	-0.007	-0.5438	0.58757		64	0.00168	0.13001	0.89678		116	-0.0106	-0.8205	0.41355	
13	-0.0242	-1.8647	0.06469	*	65	0.00406	0.31323	0.75466		117	0.00509	0.39271	0.69524	
14	-0.0149	-1.151	0.25203		66	0.03599	2.77492	0.00641	***	118	0.00554	0.40909	0.68321	
15	-0.0101	-0.7768	0.43881		67	-0.0171	-1.3152	0.19097		119	-0.0011	-0.0815	0.93517	
16	-0.0087	-0.6615	0.50957		68	-0.0203	-1.5412	0.12593		120	-0.0114	-0.8761	0.38274	
17	-0.0062	-0.4759	0.635		69	0.00511	0.39394	0.69433						
18	-0.0094	-0.7263	0.46908		70	-0.0168	-1.2964	0.19735						
19	-0.0045	-0.3509	0.72629		71	-0.0067	-0.5202	0.60386						
20	-0.0122	-0.9406	0.34879		72	0.0018	0.13926	0.88948						
21	-0.0131	-1.0091	0.31499		73	-0.0159	-1.2156	0.22654						
22	-0.0044	-0.3417	0.73318		74	-0.0071	-0.5468	0.58557						
23	-0.0058	-0.4454	0.65683		75	-0.0028	-0.2154	0.82981						
24	-0.0022	-0.1683	0.86662		76	0.00236	0.18187	0.856						
25	0.00607	0.46831	0.64042		77	-0.0144	-1.1097	0.26937						
26	-0.0057	-0.4405	0.66038		78	-0.0085	-0.6573	0.51224						
27	-0.0041	-0.3044	0.76135		79	-0.001	-0.079	0.9372						
28	-0.0005	-0.0364	0.971		80	-0.0108	-0.8338	0.40604						
29	0.00231	0.17765	0.8593		81	-0.0054	-0.4167	0.67762						
30	-0.004	-0.3066	0.75969		82	-0.0091	-0.7043	0.4826						
31	-0.0005	-0.0363	0.97108		83	-0.0078	-0.599	0.55029						

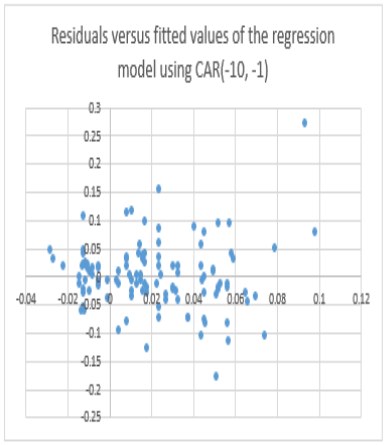
Table IX: AAR for downgrade in the bear market

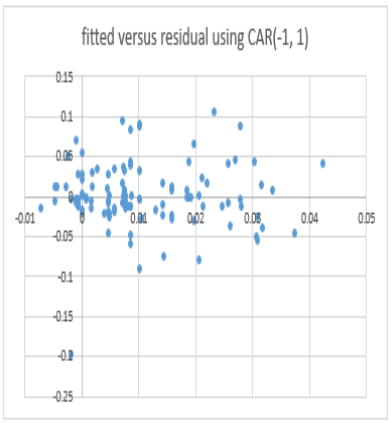
t	AAR	T	p	star	t	AAR	T	p	star	t	AAR	T	p	star
-20	-0.0019	-1.2978	0.19687		32	-0.0012	-0.8678	0.38726		84	0.00027	0.17376	0.86235	
-19	-0.0019	-1.2985	0.19662		33	0.00308	2.14874	0.03368	**	85	-0.0025	-1.5863	0.11532	
-18	-0.0003	-0.1761	0.86049		34	0.00075	0.52036	0.60378		86	-0.0006	-0.366	0.71499	
-17	0.00043	0.30258	0.76274		35	0.00269	1.86787	0.06424	*	87	0.00046	0.29013	0.77222	
-16	-0.0008	-0.5694	0.57014		36	0.00345	2.39534	0.01816	**	88	0.00087	0.54862	0.58429	
-15	-0.0009	-0.6222	0.53501		37	7.6E-05	0.0527	0.95806		89	0.00025	0.15831	0.87448	
-14	-0.0017	-1.1578	0.24927		38	-0.0014	-0.9894	0.32447		90	-0.0032	-2.0846	0.03924	**
-13	0.00016	0.11006	0.91255		39	0.00203	1.40349	0.16308		91	-0.0021	-1.3372	0.18372	
-12	-5E-05	-0.0319	0.97461		40	0.0006	0.41055	0.68214		92	-0.0029	-1.8584	0.06558	*
-11	0.00543	3.79298	0.00024	***	41	-0.0032	-2.1971	0.02995	**	93	-0.0028	-1.7657	0.08001	*
-10	0.00086	0.59958	0.54992		42	-0.0003	-0.2312	0.81752		94	0.00029	0.18544	0.8532	
-9	0.00014	0.09573	0.92389		43	-0.0015	-1.0029	0.31796		95	0.0021	1.34558	0.181	
-8	-0.0025	-1.7305	0.08613	*	44	0.00158	1.06861	0.28741		96	-0.0005	-0.3195	0.74994	
-7	0.0025	1.74916	0.08284	*	45	0.00206	1.39769	0.16481		97	0.00196	1.26189	0.20946	
-6	0.00046	0.32095	0.74881		46	-0.0004	-0.295	0.76854		98	0.0005	0.3244	0.7462	
-5	0.00594	4.1324	6.7E-05	***	47	-0.002	-1.3443	0.18141		99	0.00117	0.74354	0.45862	
-4	0.00026	0.18277	0.85529		48	0.0002	0.13267	0.89468		100	0.00173	1.09017	0.27784	
-3	0.00468	3.26246	0.00144	***	49	-0.002	-1.3368	0.18383		101	0.001	0.63715	0.52525	
-2	0.00297	2.06889	0.04072	**	50	0.00098	0.67491	0.50104		102	-0.0019	-1.202	0.23177	
-1	0.00582	4.05238	9.1E-05	***	51	0.00071	0.48488	0.62866		103	-0.0005	-0.3414	0.73339	
0	0.00425	2.96414	0.00367	***	52	0.0007	0.48129	0.63119		104	0.00214	1.34622	0.18079	
1	0.00061	0.42384	0.67245		53	-0.0032	-2.1899	0.03048	**	105	-0.0005	-0.3097	0.75736	
2	-0.0004	-0.2807	0.77943		54	0.00259	1.76755	0.0797	*	106	-0.0006	-0.3659	0.71507	
3	-0.0007	-0.5078	0.61251		55	-0.0014	-0.9627	0.33766		107	-0.0021	-1.3612	0.17601	
4	-0.0029	-1.9966	0.04815	**	56	-0.0008	-0.5149	0.6076		108	0.00158	1.02435	0.30775	
5	-0.0011	-0.738	0.46198		57	0.0011	0.75498	0.45176		109	0.00076	0.49513	0.62142	
6	-0.0023	-1.606	0.11092		58	-0.0013	-0.906	0.36676		110	-0.0035	-2.2938	0.02355	**
7	0.00079	0.55164	0.58223		59	-0.0018	-1.2176	0.2258		111	-0.002	-1.3175	0.19021	
8	0.00183	1.27533	0.20468		60	-0.0007	-0.4743	0.63613		112	0.00028	0.1833	0.85487	
9	-0.0013	-0.9418	0.34819		61	0.00013	0.08664	0.9311		113	0.00069	0.45037	0.65326	
10	0.00095	0.66329	0.50843		62	-0.0008	-0.5112	0.61017		114	-0.0036	-2.3781	0.019	**
11	0.00277	1.93325	0.05558	*	63	-0.0015	-0.9828	0.32772		115	0.00041	0.26526	0.79127	
12	0.00124	0.86294	0.38991		64	-0.0002	-0.1072	0.91484		116	-0.0004	-0.2312	0.81752	
13	0.00097	0.67699	0.49973		65	1.40E-04	0.09471	0.92471		117	0.00286	1.85465	0.06612	*
14	-0.0004	-0.2761	0.78297		66	-0.0007	-0.4559	0.64929		118	-0.0014	-0.9006	0.36964	
15	-0.003	-2.1072	0.0372	**	67	-0.0021	-1.398	0.16472		119	0.00024	0.14786	0.88271	
16	-0.0012	-0.8183	0.41481		68	-0.0013	-0.866	0.38823		120	-0.0028	-1.7423	0.08403	*
17	-0.0025	-1.7771	0.07811	*	69	0.00029	0.19494	0.84577						
18	0.001	0.70058	0.48493		70	0.00049	0.33705	0.73668						
19	0.00173	1.20189	0.23179		71	-2E-05	-0.0168	0.98659						
20	0.00115	0.79939	0.42566		72	0.00287	1.96364	0.0519	*					
21	0.00055	0.38663	0.69972		73	0.00308	2.09535	0.03826	**					
22	-0.0003	-0.2413	0.80975		74	-0.0007	-0.451	0.65281						
23	0.00108	0.75636	0.45093		75	########	-0.0012	0.99902						
24	0.00033	0.22746	0.82046		76	-0.0024	-1.6289	0.10597						
25	-0.0026	-1.7883	0.07627	*	77	0.00167	1.13479	0.25875						
26	-0.0005	-0.3286	0.74302		78	0.00072	0.48447	0.62894						
27	0.00116	0.80611	0.42179		79	0.00268	1.7725	0.07887	*					
28	-0.0004	-0.281	0.77916		80	-0.0006	-0.3849	0.70096						
29	-0.0003	-0.1773	0.85955		81	1.2E-05	0.00744	0.99407						
30	-0.0008	-0.5629	0.57455		82	-0.003	-1.9227	0.05691	*					
31	0.00321	2.22992	0.02763	**	83	-0.0009	-0.5547	0.58014						

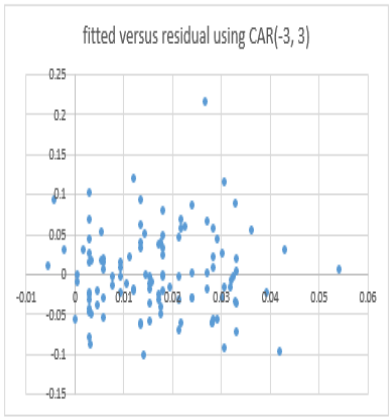
Table X: AAR for the buy group

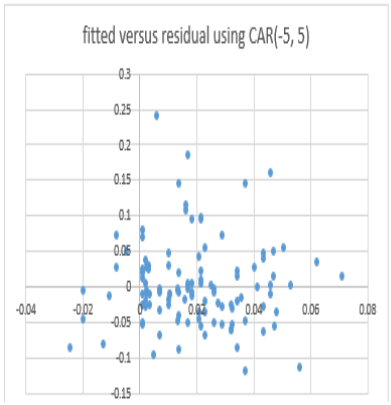
t	AAR	T	p	star	t	AAR	T	p	star	t	AAR	T	p	star
-20	-0.0017	-0.5882	0.55749		32	0.00293	1.00381	0.31751		84	-0.0064	-2.1747	0.03163	**
-19	-0.0044	-1.5166	0.13201		33	-0.0031	-1.0564	0.29292		85	0.00542	1.85341	0.0663	*
-18	-0.0026	-0.8815	0.37981		34	-0.0008	-0.2792	0.78055		86	0.00202	0.69819	0.48642	
-17	0.00058	0.19913	0.8425		35	-0.0004	-0.1478	0.88273		87	0.00456	1.5714	0.11875	
-16	-0.0012	-0.4037	0.68713		36	-0.0024	-0.8129	0.41791		88	0.01053	3.60029	0.00046	***
-15	0.00877	3.02135	0.00308	***	37	-1E-05	-0.0037	0.99702		89	-0.0056	-1.9229	0.05688	*
-14	-0.0045	-1.5355	0.12731		38	-0.0001	-0.045	0.96415		90	-0.0088	-3.0162	0.00313	***
-13	0.00995	3.41194	0.00088	***	39	0.00182	0.62041	0.53617		91	-0.0033	-1.1262	0.26236	
-12	0.0011	0.37962	0.70491		40	-0.0007	-0.2512	0.8021		92	0.00176	0.60695	0.54504	
-11	0.0063	2.17392	0.03169	**	41	0.00121	0.41376	0.6798		93	0.00573	1.96711	0.0515	*
-10	-0.0062	-2.1482	0.03373	**	42	-0.0047	-1.6035	0.11147		94	-0.0008	-0.2643	0.79198	
-9	-0.0017	-0.5898	0.55646		43	0.00396	1.35706	0.17733		95	0.00013	0.04586	0.9635	
-8	0.00226	0.78056	0.43661		44	-0.0002	-0.0522	0.95843		96	-0.0067	-2.3002	0.02318	**
-7	0.00063	0.21623	0.82918		45	0.00378	1.28855	0.20005		97	-0.0018	-0.6173	0.53823	
-6	-0.0028	-0.9468	0.34564		46	-0.0013	-0.4514	0.65251		98	0.00198	0.66927	0.50462	
-5	0.00516	1.77332	0.07873	*	47	-0.001	-0.3421	0.73286		99	-0.0028	-0.9414	0.3484	
-4	-0.0012	-0.4089	0.68333		48	-0.0034	-1.1683	0.24501		100	0.0014	0.48149	0.63105	
-3	-0.0002	-0.0596	0.95258		49	-0.0053	-1.8083	0.07308	*	101	-3E-05	-0.0101	0.99195	
-2	-0.0046	-1.5707	0.11891		50	0.00422	1.43766	0.15316		102	-0.002	-0.6997	0.48547	
-1	-0.0032	-1.0911	0.27743		51	0.00719	2.45491	0.01554	**	103	-0.0042	-1.4507	0.1495	
0	0.01098	3.76409	0.00026	***	52	-0.004	-1.3654	0.17469		104	0.00353	1.21415	0.2271	
1	0.0024	0.82765	0.40952		53	0.00259	0.87525	0.3832		105	0.00151	0.52041	0.60375	
2	0.00235	0.81076	0.41912		54	0.00364	1.23921	0.21771		106	0.00037	0.12579	0.90011	
3	-0.0002	-0.0583	0.95358		55	-0.0091	-3.0985	0.00243	***	107	-0.0004	-0.141	0.88809	
4	-0.0003	-0.107	0.91495		56	-0.0043	-1.46	0.14692		108	-0.003	-1.0438	0.29868	
5	0.00078	0.26803	0.78914		57	0.00261	0.87012	0.38599		109	-0.001	-0.3389	0.73525	
6	-0.0007	-0.2429	0.80847		58	0.00312	1.05607	0.29307		110	-0.0049	-1.6814	0.0953	*
7	-0.0007	-0.2334	0.81588		59	-0.0027	-0.9203	0.3593		111	0.00418	1.42067	0.15803	
8	0.00378	1.30194	0.19545		60	0.00217	0.72736	0.46844		112	0.00176	0.60136	0.54875	
9	0.00846	2.89666	0.00449	***	61	-0.0046	-1.5452	0.12494		113	-0.0005	-0.1617	0.87184	
10	0.00815	2.81042	0.00579	***	62	0.00316	1.0606	0.29102		114	-0.0008	-0.259	0.79606	
11	-0.0026	-0.8789	0.38121		63	0.00099	0.33659	0.73702		115	0.00316	1.06221	0.29029	
12	-0.0011	-0.3896	0.69754		64	0.00216	0.73497	0.4638		116	-0.0054	-1.7957	0.07508	*
13	-0.0082	-2.8028	0.00592	***	65	0.00073	0.24403	0.80763		117	0.00284	0.96425	0.33687	
14	-0.0053	-1.831	0.0696	*	66	0.00589	1.99037	0.04884	**	118	-0.0027	-0.8992	0.37037	
15	0.00074	0.25299	0.80071		67	0.00404	1.36622	0.17445		119	0.00487	1.59514	0.11333	
16	-0.002	-0.6967	0.48734		68	-0.0017	-0.5927	0.55451		120	0.00269	0.86293	0.38991	
17	0.0006	0.20705	0.83632		69	-0.0002	-0.0715	0.94313						
18	0.00058	0.20088	0.84113		70	0.00354	1.19861	0.23306						
19	0.00108	0.37255	0.71015		71	-0.0023	-0.7947	0.42839						
20	0.0061	2.0943	0.03836	**	72	-0.0006	-0.2008	0.84119						
21	-0.0083	-2.8386	0.00533	***	73	0.00414	1.39883	0.16446						
22	-0.0059	-2.0165	0.046	**	74	0.00579	1.96157	0.05215	*					
23	-0.0051	-1.7489	0.08288	*	75	0.00089	0.29901	0.76545						
24	-0.0013	-0.4583	0.64758		76	-0.0049	-1.6275	0.10627						
25	0.0039	1.33758	0.18358		77	0.00484	1.62023	0.10783						
26	-0.0032	-1.1116	0.26856		78	0.00091	0.29855	0.7658						
27	-0.0029	-0.9869	0.32568		79	-0.0012	-0.3858	0.70033						
28	0.00429	1.4751	0.14283		80	0.00054	0.17786	0.85914						
29	-0.0041	-1.4232	0.1573		81	0.0031	1.06296	0.28995						
30	0.00039	0.13453	0.89321		82	0.00122	0.41443	0.6793						
31	-0.0034	-1.169	0.24474		83	-0.0026	-0.9046	0.36749						

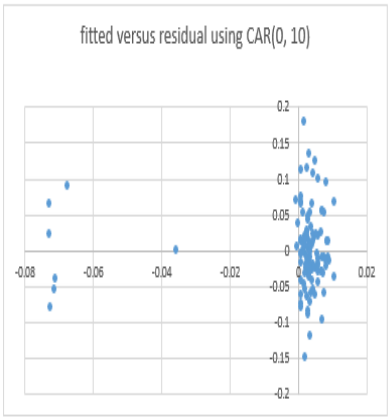
Table XI: AAR for the sell group











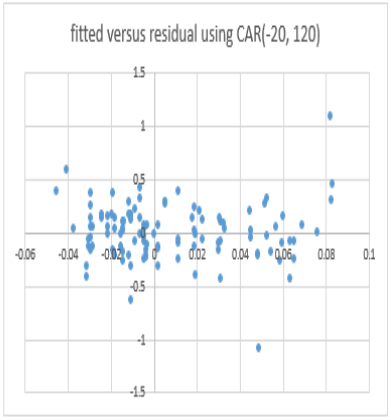
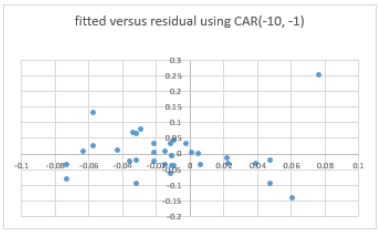
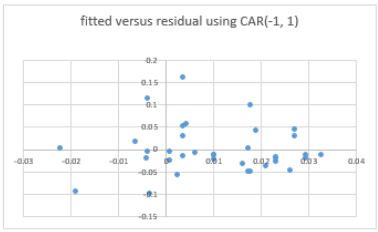
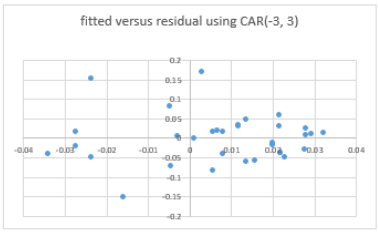
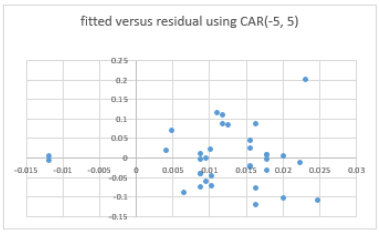


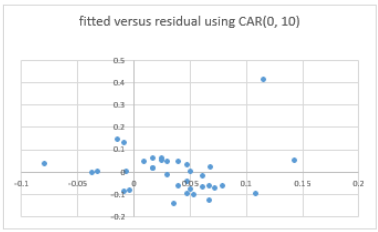
Table XII: residual plot for the buy group











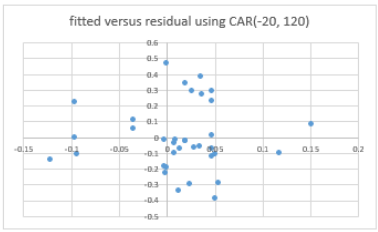


Table XIII: residual plot for the Sell group

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of CAR101

         chi2(1)      =    32.70
         Prob > chi2  =   0.0000
```

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of CAR55

         chi2(1)      =     0.23
         Prob > chi2  =   0.6306
```

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of CAR11

         chi2(1)      =     0.05
         Prob > chi2  =   0.8269
```

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of CAR010

         chi2(1)      =     0.66
         Prob > chi2  =   0.4164
```

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of CAR33

         chi2(1)      =     1.72
         Prob > chi2  =   0.1899
```

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of CAR20120

         chi2(1)      =    23.86
         Prob > chi2  =   0.0000
```

Table XVI: Breusch-Pagan test results for buy groups

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of CAR101

         chi2(1)      =    18.72
         Prob > chi2  =   0.0000
```

```
Breusch-Pagan / Cook-Weisberg test for he
         Ho: Constant variance
         Variables: fitted values of CAR5

         chi2(1)      =     4.43
         Prob > chi2  =   0.0353
```

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of CAR11

         chi2(1)      =     3.63
         Prob > chi2  =   0.0569
```

```
Breusch-Pagan / Cook-Weisberg test for hete
         Ho: Constant variance
         Variables: fitted values of CAR01(

         chi2(1)      =    14.26
         Prob > chi2  =   0.0002
```

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of CAR33

         chi2(1)      =     7.66
         Prob > chi2  =   0.0056
```

```
Breusch-Pagan / Cook-Weisberg test for hete
         Ho: Constant variance
         Variables: fitted values of CAR201

         chi2(1)      =     0.24
         Prob > chi2  =   0.6262
```

Table XV: Breusch-Pagan test results for sell groups