# How Analyst Recommendations Respond to Corporate Uncertainty Caused by Investment Behavior: Currying Favor with Management or Conflicts of Interest from Connections

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**Abstract:** Corporate investment behavior increases the uncertainty of a company's operation and performance. This study investigates how analyst recommendations respond to corporate uncertainty caused by investment behavior and what motivates analysts to react as they do. We test two motivation hypotheses: the hypothesis that analysts are currying favor with management to obtain private information and the hypothesis that analysts have conflicts of interest due to connections. Using Chinese analyst-level data from 2007 to 2015, we find that overall investment levels, R&D investment and M&A events are significantly positively correlated with analyst recommendations, suggesting that analysts tend to react optimistically to corporate investment behavior. However, analysts are only optimistic about companies with low information transparency, suggesting that analysts may be trying to curry favor with management to gain access to private information. We find that analysts with stronger recommendations have more private information and analysts with more private information publish more accurate earnings forecasts, which supports the hypothesis that analysts curry favor with management through optimistic recommendations to obtain more private information. This is consistent with the logic that the difficulty of earnings forecasting increases under uncertain conditions, increasing the demand for private information. We then group the analysts according to their underwriting connections, securities company's proprietary connections and fund connections, and find that the positive correlation between corporate investment behavior and analyst recommendations exists only in the unconnected groups. This is evidence against the hypothesis that analysts have conflicts of interest due to their connections.

**Keywords:** investment behavior; uncertainty; analyst optimism; curry favor with management; private information; relationships

## 1. Introduction

Companies face many uncertainties in their operation. When uncertainty increases, the discretion in financial reporting and the uncertainty of earnings increase, which leads to difficulties with valuations based on accounting information. Investors' demand for analyst services as information intermediaries increases accordingly.

Investment behavior increases the uncertainty of a company's operation and performance in many ways, making it a good situation for studying what influences analysts' behavior under uncertain conditions. Firstly, there are many kinds of investment, including fixed assets investment, R&D investment and M&As. Moreover, one company can have many investment projects spanning different industries and their comprehensive impact is complex. The object of the investment itself is highly professional and requires professional knowledge about the industry and specific business. Secondly, investments contribute to corporate value through future cash flows but future cash flows are influenced by the macro-economy, industry cycle, corporate governance and other factors, making it hard to disentangle the contribution of the investment. Finally, corporate investments have long-term impacts and investment processes are likely to be long term; for example, R&D investment can be a continuous process.

Analysts, as important intermediaries that reduce information asymmetries between investors and companies, have received sustained attention from researchers. Despite numerous studies, the decision-making process of analysts is still a black box. Researchers do not have a clear understanding of what information analysts use and how they produce their analyses (Bradshaw, 2011). Studies show that analysts have a systematic tendency to be optimistic, but when studying analysts' optimistic tendencies, researchers only analyze the outputs of analysts without including analysts' specific information inputs. In this paper, we study whether analysts make systematic optimistic recommendations when faced with uncertainty caused by corporate investment behavior and what motivates analysts to be optimistic in this context.

Analysts need more information when facing the uncertainty caused by corporate

investment behavior. We test whether analysts have a motivation to curry favor with management to gain access to private information. If analysts obtain more private information by currying favor with management, they increase their profits. Analysts' motivation to share benefits with related parties is replaced when analysts can gain by getting more private information. We test two existing hypotheses. The first is that analysts use optimistic recommendations to curry favor with management to obtain private information; the second is that there are conflicts of interest resulting from connections between analysts and management.

We use data from the Chinese stock market for two reasons. Firstly, as the largest emerging market, China has serious problems of protecting investors' interests because of its imperfect legal and institutional environments. In China, analysts are not generally trusted. There are countless media reports of the "hidden rules" of the analyst industry. Incidents of analysts misleading investors using published analytical reports occur frequently. Secondly, the Chinese stock market provides a unique data set that allows us to identify analysts' connections. With the limited data available for European and American markets, one can only accurately identify investment banking business connections. In the Chinese stock market, there are detailed securities company self-owned stocks data which make it easy for us to identify securities companies' proprietary connections; data on which stocks are held by funds and on funds' trading commissions in different securities companies are helpful for us to identify fund connections.

We use companies' overall investment levels, R&D investments and M&A events to measure the operating uncertainty caused by corporate investment behavior. We find that overall investment levels, R&D investment and M&A events are significantly positively correlated with analyst recommendations and that these relationships exist only for companies with low information transparency, suggesting that analysts use optimistic recommendations to curry favor with management to obtain private information. We also find that analysts with more positive recommendations have more private information and that analysts with more private information publish more accurate earnings forecasts, further supporting the

hypothesis that analysts curry favor with management through optimistic recommendations to obtain more private information. We then group analysts according to their underwriting connections, securities company's proprietary connections and fund connections and find that the positive correlation between corporate investment behavior and analyst recommendations exists only for the unconnected groups. This indicates that conflicts of interest from connection are not of major concern under uncertain conditions. We further study the impact of corporate investment behavior on analyst coverage and the economic consequences of analysts' optimistic tendencies when facing the uncertainty caused by corporate investment behavior. We find that a company' s investment behavior attracts more analysts to cover it. Using the derived variables of Barron et al. (1998) to measure the overall level of private information of all analysts following a company, we find that the greater the uncertainty of the company caused by its investment behavior, the higher the overall level of private information of the analysts. This explains why investment-caused uncertainty causes more analysts to follow a company. In terms of economic consequences, we find that analysts' optimistic tendencies lead to overvaluation of stock prices.

This paper makes two contributions. Firstly, we link the optimism of analysts with the uncertainty of analysts' information inputs to partially unpack the black box of analysts' analyses. Secondly, we test the two hypotheses mentioned. There is a lack of comparative studies on the influence of different motivations on the behavior of analysts. Existing studies that focus on the motivation arising from conflicts of interest due to connections could mislead people into thinking that this motivation is the only or dominant motivation for analysts' optimism. This is not conducive to a comprehensive and objective understanding of analyst behavior. Under the uncertain conditions caused by corporate investment behavior, our findings support the hypothesis that analysts issue optimistic recommendations to curry favor with management to obtain private information; we do not find support for the hypothesis that the recommendations are the result of conflicts of interest from connections.

The rest of the paper is organized as follows. Section 2 details the institutional

background. Section 3 reviews the literature. Section 4 develops the hypotheses and section 5 specifies the research design we use to test them. Section 6 presents the empirical regression results. Section 7 discusses further research and the robustness of our results. Section 8 provides a summary and conclusions.

## 2. Institutional Background

Since beginning the process of opening up, China's economy has maintained a high growth rate, with an average annual growth rate of 9.7% between 1978 and 2016. This far exceeds the growth rates of other major developed and developing economies over the same period. In 2017, China's GDP of 11.94 trillion U.S. dollars was the second biggest in the world, 61.67% of the first (the U.S., with a GDP of 19.36 trillion U.S. dollars) and 2.45 times that of the third (Japan, with a GDP of 4.88 trillion U.S. dollars). China's economy is growing rapidly, but it is generally believed to have a high degree of dependence on investment (Zhu and Kotz, 2011; Shambaugh, 2016). The average contribution rate of investment to China's economic growth over the past 40 years is 38.3%; it is 51.91% when considering just since 2000. The "investment dependence" of China's economy (measured by dividing fixed assets investment by GDP) was 15.8% in 1986, 32.3% in 1996, 50.2% in 2006 and 80.2% in 2016. The incremental capital output rate (ICOR) is commonly used in economics to measure how much investment is needed to achieve a percentage point of GDP growth. China's ICOR was 4.0 in 2000, 5.4 in 2012, 10.0 in 2013 and 14.0 in 2015. This shows that China's economic growth is consuming more and more money. China's increasing dependence on investment has been accompanied by lower and lower investment efficiency. Investment-driven growth creates serious internal imbalances leading to overcapacity and high debt risk. The dependence of China's economic development on investment is manifested in companies' high investments with high debts and low efficiency at the micro level. Figure 1 shows the annual average investment and earnings of Chinese listed companies from 2000 to 2015. The investment level of Chinese listed companies has been growing but the profit level has not improved in step. Especially since 2011, the investment level of Chinese listed companies has increased rapidly but companies' profits have hardly changed. Because

the investment decisions of companies are guided by the national industrial policy, companies are not entirely free to make decisions under the condition of market competition. This makes companies' future operating performance more uncertain. In environments with greater uncertainty, information asymmetries between investors and companies are greater, which increases the demand for market intermediaries such as analysts.

[Insert Figure 1 here]

China's stock market is growing. There were 3,052 companies with a total market value of $7.32 trillion listed on the Shanghai and Shenzhen stock exchanges at the end of 2016, making China's stock market the second biggest in the world. At the same time, there were 118.1104 million trading accounts, of which 117.7842 million were individual accounts and 326,200 were institutional accounts. The institutional ownership of the stock market was worth $4.9 trillion, accounting for 66.9% of the total market value; in 2002, it was only 5%. With the development of China's stock market, analysts play an increasingly important role as market intermediaries. According to the China Securities Industry Association (China Securities Industry Development report, 2017), 2330 seller analysts from 129 securities firms released 152,100 investment reports in 2016, of which 1,5482 were in-depth analysis reports. Analysts give recommendations on stocks in their investment reports. The recommendations are classified as "strong buy," "buy," "neutral," "sell" and "strong sell" from high to low. As in mature capital markets, Chinese analysts give mainly "strong buy" and "buy" recommendations; the proportion of "neutral," "sell" and "strong sell" ratings is very low. According to our statistics, the latter three recommendations account for about 10% of recommendations.

Analysts are under pressure to make profits for their securities firms. Table 1 shows the operating income and composition of Chinese securities companies between 2012 and 2016. As can be seen, the main sources of income are agency securities trading, own securities investment, underwriting and margin financing. Securities companies have a great motivation to maintain these businesses. These activities of securities companies give analysts three kinds of connections. The first is

a connection with the investment banking department of the securities company if a company the analyst follows has an underwriting relationship with the investment banking department of the securities company. The second is a connection with the proprietary department of the securities company if a company the analyst follows is closely held by the proprietary department of the securities company. The third is a connection with funds if an analyst follows a company in which the funds who divide trading commissions in the securities company has a strong position.

[Insert Table 1 here]

Analysts' recommendation reports are released publicly so both individual and institutional investors have access to the reports. However, the use of the reports and their impact on analysts' motivations are different. Most individual investors in the Chinese stock market lack professional knowledge. Their short-term trading is conducted directly according to the analysts' final recommendations, while mature institutional investors pay more attention to the information provided by analysts and their specific analyses. In Chinese securities firms, analysts' incomes are mainly determined by the commissions of the institutional investors in their companies, so the main purpose of analyst investment reports is to attract mature institutional investors. This gives analysts more incentive to curry favor with management to gain more private information so that the analysts can provide institutional investors with more effective information and investment analyses. In addition, in the Chinese capital market, the star analyst selection conducted by New Fortune magazine is very influential and the salary of an analyst greatly increases after being selected as a star analyst. The voters for star analyst selection are mainly institutional investors, which also leads analysts to pay more attention to the needs of institutional investors.

## 3. Literature review

### 3.1 Literature on analysts' information inputs

The behavior of analysts can be studied in the framework of "information input-decision process-information output" (Ramnath et al., 2008; Bradshaw, 2011). Research on analysts focuses on the characteristics and economic consequences of analyst forecasts and recommendations, with relatively little study of analysts' inputs

and decision-making processes. Studies of the information inputs of analysts are usually empirical analyses of which information affects analysts' coverage decisions based on the correlations between variables. These studies identify several possible information inputs. Ely and Mande (1996) and Denis et al. (1994) find that dividend information supplements company earnings information, especially when earnings information contains noise. Williams (1996) investigates the use of management earnings forecasts. Several studies look at the role of communication and investor relations (Lang and Lundholm, 1996; Barron et al., 1999; Healy et al., 1999; Bowen et al., 2002). Information on R&D and advertising expenditures are also found to be of use (Barth et al, 2001). Finally, it is found that analysts use company stock price performance (Conrad et al., 2006). A few studies have used other methods to directly understand the information used by analysts. Previts et al. (1994) conduct a text analysis of analysts' reports and find that analysts use information related to earnings and that they rely heavily on information provided by management beyond that contained in annual reports. Rogers and Grant (1997) use text analysis to show that analysts use many non-financial reports, both within and outside annual reports. The literature now focuses on the motivations of analysts, neglecting further exploration of analysts' information inputs.

3.2 Literature on the role of analysts

Analysts play two main roles: information discovery and information interpretation. There is evidence supporting both roles. Some studies find that the degree of information asymmetry as measured by the bid-ask spread is negatively correlated with analyst coverage (Brennan and Subrahmanyam, 1995; Van Ness et al., 2001) and that the level of corporate information disclosure is significantly positively correlated with analyst coverage, which supports analysts' role in information interpretation. In addition, Barron et al. (2002), Byard and Shaw (2003) and Asquith et al. (2005) provide evidence for analysts' role in information interpretation. There are many studies supporting analysts' information discovery role. Diamond (1985) argues that corporate disclosure reduces the value of analysts' private information production. Some studies find that information asymmetries worsen with increased

analyst followings (Ahn et al., 2005; Bhushan, 1989; Chung et al., 1995; Moyer et al., 1989). Barth et al. (2001) prove that analysts' reports become more valuable and more demanded when corporate financial reports provide less information about a company's value.

3.3 Literature on conflicts of interest and analysts' optimistic

Conflicts of interest can lead analysts to be optimistic. There are three types of conflicts of interest which researchers often consider. The first is analysts' incentive to promote transactions to increase their commission income (O'Brien and Bhushan, 1990; McNichols and O'Brien, 1997; Jackson, 2005; Cowen et al., 2006; Agrawal and Chen 2008; Jacob et al., 2008). The second type is conflicts of interest arising from connections, such as investment banks' underwriting business connections (Lin and McNichols, 1998; Michaely and Womack, 1999; O'Brien et al., 2005; Mehran and Stulz, 2007; Gu and Xue, 2008), securities companies' self-operating securities business connections (Cao Sheng and Zhu Hongjun, 2011) and institutional investors' connections (Gu et al., 2012; Firth et al., 2013). The third type of conflict of interest is when analysts try to curry favor with management to obtain private information (Francis and Philbrick, 1993; Das et al., 1998; Lim 2001). These three motivations are not mutually exclusive. Most studies focus on a single motivation; few studies look at which motivation plays a dominant role in a specific situation. Gu et al. (2012) study analysts' trading promotion motivation and the pressure from institutional investors' connections motivation against the background of fund trading sub-positions. They find that when analysts and funds have transaction commission sub-position relationships, analysts' optimism originates from the pressure motivation rather than from the transaction motivation.

## 4. Hypothesis development

The ultimate purpose of analysts is to evaluate companies. The uncertainty in a company's operation and performance caused by investment behavior is closely related to the company's valuation and so it affects analyst behavior. Haw et al. (1994) find that the complexity of analysts' predictions increases and the accuracy of predictions decreases after a company's merger and acquisition. The accuracy of

predictions does not return to the pre-merger level for four years. Duru and Reeb (2002) find that the accuracy of analysts' forecasts decreases with increases in a company's international diversification. We use a company's overall investment level, R&D investments and M&A events to measure the uncertainty caused by the company's investment behavior to study the behavior of analysts in these uncertainty conditions.

According to modern financial theory, companies invest optimally given their constraint of existing resources because over-investment or under-investment damage the value of the company. Therefore, there is no simple positive or negative correlation between firm value and investment level in theory. R&D investments are very uncertain and failure is a possibility, so such investments should not necessarily increase the value of a company. For M&A events, Bruner (2002) summarizes a large body of literature on M&A value creation and finds that most studies report that M&A events do not significantly increase the value of the company that launches the M&A. Studies on the financial performance of companies after M&A events mostly find that performance decreases (Sharma and Ho, 2002). Therefore, if analysts are objective and impartial, analysts should not systematically give higher recommendations to companies with higher investment levels, higher R&D levels or M&As. However, analysts have many conflicts of interest, leading to a general optimistic tendency, and they are likely to show an optimistic tendency in the face of corporate investment behavior. Hypothesis H1a is based on this idea.

Bhushan (1989) develops a model to point out that the impact of corporate disclosure on analysts depends on whether analysts play an information interpretation role or an information discovery role in capital markets. If analysts play an information interpretation role, they simply analyze companies' disclosures and pass on the information to the market, which means that more transparent disclosures by companies makes the analysts' reports more valuable and increases the demand for analysts' services. If analysts play an information discovery role, there will be competition between analysts and companies for disclosures and more transparency in corporate disclosures reduces the demand for analysts. When facing the uncertainty

caused by investment, analysts need more information to judge the value of a company, so the availability of information becomes a key issue. If a company's disclosures are inadequate, analysts are more motivated to access private information to play the role of information discovery. If a company is highly transparent and disclosures are timely, the incentive for analysts to discover information is weakened. An important way for an analyst to play an information discovery role is to curry favor with management to obtain private information. Therefore, if analysts tend to be optimistic about a company's investment behavior as proposed by hypothesis H1a, analysts might want to curry favor with management to obtain private information. This is hypothesis H1b.

**H1a: Holding other conditions fixed, analyst recommendations are higher for companies with a higher overall investment level, those with a higher R&D level, and those with a recent M &A event.**

**H1b: H1a holds only for companies with low information transparency.**

Hypotheses H1a and H1b suggest that analysts are motivated to curry favor with management to get more private information when facing highly uncertain conditions. Studies confirm that analysts do have an incentive to curry favor with management. Francis and Philbrick (1993) find that analysts tend to make more optimistic earnings forecasts to curry favor with management when they issue lower investment ratings. Das et al. (1998) find that when a company's historical earnings are unpredictable, analysts tend to make more optimistic earnings forecasts to curry favor with management because analysts have a higher demand for non-public information. The uncertainty caused by the investment behaviors discussed in this paper make it more difficult to predict earnings accurately. The accuracy of earnings forecasts is very important to analysts. Mikhail et al. (1999) find that the accuracy of analysts' earnings forecasts is positively correlated with their job-hopping but not with their stock recommendations. Hong et al. (2000) find that the accuracy of earnings forecasts is directly related to promotions, especially for less experienced analysts. Therefore, when analysts face the uncertainty caused by corporate investment behavior, they have an incentive to issue optimistic recommendations to curry favor with

management, maintain relationships with management and obtain more private information to improve the accuracy of their earnings forecasts. More optimistic analysts expect to get more private information from management to make more accurate earnings forecasts. We measure the level of private information that analysts have as the number of reports they release; the more reports they release, the more private information analysts have. We propose the following two hypotheses to clarify the idea that analysts curry favor with management.

**H2a: Holding other conditions fixed, analysts with higher recommendations release more reports.**

**H2b: Holding other conditions fixed, analysts who release more reports have more accurate earnings forecasts.**

As noted in the literature review, several studies show that analysts tend to be optimistic because of conflicts of interest from underwriting, proprietary and institutional investor connections. However, analysts face risks of losing credibility and being punished by regulations when issuing optimistic reports, so analysts weigh risks against benefits. We focus on three kinds of analysts' relationships: underwriting connections, securities companies' proprietary connections and fund connections. The impact of corporate investment behavior (especially M&As) is often greater than companies' other daily business activities. It is easy for the media or regulators to associate analysts' interests with analysts' optimistic comments, which puts analysts at risk of being distrusted. However, if the hypothesis that analysts are currying favor with management holds and analysts increase their earnings by obtaining private information from management, then the pressure from relationships is reduced. In summary, we believe that in the face of the uncertainty caused by corporate investment behavior, analysts' ratings are less likely to be affected by the conflicts of interest from relationships. Accordingly, we propose the following three hypotheses.

**H3a: The positive correlation in hypothesis H1a exists only for analysts without an underwriting connection.**

**H3b: The positive correlation in hypothesis H1a exists only for analysts without a proprietary connection.**

**H3c: The positive correlation in hypothesis H1a exists only for analysts without a fund connection.**

## 5. Research design

### 5.1 Sample selection and data sources

This paper uses analyst-level data from China from 2007 to 2015. Our focus is on analysts' assessments of companies' final values for the year, so we retain only the last recommendation each analyst releases for each year. A sample of financial companies and companies processed by ST is removed, as are observations with missing data, leaving 39,835 observations for the main analysis. In testing hypothesis H1b, only the Shenzhen Stock Exchange rates the information disclosures of listed companies, so the sample size is 19,774. When testing hypothesis H2b, the sample size is 32,504 because of the lack of data on the accuracy of earnings forecasting. To eliminate the influence of outliers, all continuous variables are winsorized at the top and bottom at the 5% threshold. The data in this paper come from the CSMAR database.

### 5.2 Variables and research models

To test our hypotheses, we develop models (1), (2) and (3). Model (1) is used to test hypothesis 1; because analyst recommendations have only 5 ordered integers, an ordered logical regression model is used. If hypothesis H1a holds, then the coefficients $\alpha_1$ and $\alpha_2$ in model (1) should be significantly positive. If hypothesis H1b holds, then the coefficients $\alpha_1$ and $\alpha_2$ should be significantly positive only in the low information transparency group. Models (2) and (3) are used to test hypotheses H2a and H2b, respectively. If H2a holds, the coefficient $\beta_1$ should be significantly positive. If H2b holds, the coefficient $\gamma_1$ should be significantly negative, as the more personal information an analyst has, the more accurate the analyst's earnings forecast should be (i.e., the larger the variable Fcst is, the more inaccurate the forecast is). To test hypothesis H3, we use model (1) after grouping observations according to SponsorR, Institution R and FundR. If the hypothesis holds,

the correlations should only be significant for non-connected groups. In terms of control variables, we follow other studies and control for characteristics of analysts that influence their behavior and characteristics of companies that analysts pay attention to. Analyst characteristics include whether the analyst is a star analyst (Star), the size of the brokerage firm the analyst works at (InstitutionS), the analyst's connection relationships (SponsorR, InstitutionR, FundR), the analyst's experience (LnAnalystE) and the analyst's following numbers (LnFollowCN). Corporate characteristics include company size (Size), growth (PB), performance (ChROA), liquidity (Volume), insider shareholding (InsiderOwn), institutional investor shareholding (InstOwn) and company property rights (SOE). The definition and measurement of variables in the models are shown in the appendix.

$$\begin{aligned}&\text{ologit}(Rank) = \alpha_0 + \alpha_1 Invst(\text{or } M\ \&\ A)(\text{or R \& D})\\&+ \alpha_2 Invst\_LstYear(\text{or } M\ \&\ A\_LstYear)(\text{or } R\ \&\ \text{D}\_LstYear)\\&+ \alpha_3\text{Star} + \alpha_4\text{InstitutionS} + \alpha_5\text{SponsorR} + \alpha_6\text{InstitutionR} + \alpha_7\text{FundR}\\&+ \alpha_8\text{LnAnalystE} + \alpha_9\text{LnFollowCN} + \alpha_{10}\text{Size} + \alpha_{11}\text{PB} + \alpha_{12}\text{ChROA}\\&+ \alpha_{13}\text{Volume} + \alpha_{14}\text{InsiderOwn} + \alpha_{15}\text{InstOwn} + \alpha_{16}\text{SOE} + \text{Industry} + \text{Year} + \varepsilon \quad (1)\end{aligned}$$

$$\begin{aligned}&\text{LnReportN} = \beta_0 + \beta_1 Rank + \beta_2 Invst(\text{or } M\ \&\ A)(\text{or R \& } D)\\&+ \beta_3 Invst\_LstYear(\text{or } M\ \&\ A\_LstYear)(\text{or R \& } D\_LstYear)\\&+ \beta_4\text{Star} + \beta_5\text{InstitutionS} + \beta_6\text{SponsorR} + \beta_7\text{InstitutionR} + \beta_8\text{FundR}\\&+ \beta_9\text{LnAnalystE} + \beta_{10}\text{LnFollowCN} + \beta_{11}\text{Size} + \beta_{12}\text{PB} + \beta_{13}\text{ChROA}\\&+ \beta_{14}\text{Volume} + \beta_{15}\text{InsiderOwn} + \beta_{16}\text{InstOwn} + \beta_{17}\text{SOE} + \text{Industry} + \text{Year} + \varepsilon \quad (2)\end{aligned}$$

$$\begin{aligned}&\text{FcstAcc} = \gamma_0 + \gamma_1 Ln\ \text{Re port}N + \gamma_2 Invst\ (\text{or } M\ \&\ A)(\text{or R \& } D)\\&+ \gamma_3 Invst\_LstYear\ (\text{or } M\ \&\ A\_LstYear\ )(\text{or } R\ \&\ D\_LstYear\ )\\&+ \gamma_4\text{Star} + \gamma_5\text{Institutio nS} + \gamma_6\text{SponsorR} + \gamma_7\text{Institutio nR} + \gamma_8\text{FundR}\\&+ \gamma_9\text{LnAnalystE} + \gamma_{10}\text{LnFollowCN} + \gamma_{11}\text{Size} + \gamma_{12}\text{PB} + \gamma_{13}\text{ChROA}\\&+ \gamma_{14}\text{Volume} + \gamma_{15}\text{InsiderOwn} + \gamma_{16}\text{InstOwn} + \gamma_{17}\text{SOE} + \text{Industry} + \text{Year} + \varepsilon \quad (3)\end{aligned}$$

5.3 Descriptive statistics

Table 2 reports the type and annual distribution of analysts' recommendations. Analysts' average recommendations increase across time, other than in 2007 and 2012. The higher recommendations in 2007 may be due to a bull market, while in 2012 there is a brief decline due to a bear market. Analysts become less and less likely to issue negative recommendations (including "sell," "strong sell" and "neutral") over

time, with the proportion of negative recommendations declining from a peak of 24.9% in 2008 to 3.5% in 2015. The percentage of "strong buy" recommendations increases from 20.7% in 2008 to 53.1% in 2015. There is an increasingly optimistic trend in Chinese analyst recommendations.

[Insert Table 2 here]

Table 3 reports the descriptive statistics of the main variables. The average value of Invst is 0.078, which shows that the annual average proportion of new investment in the total assets of listed companies in China is 7.8% per year. The average R&D is 0.011 and the median is 0.002, which means that R&D investments are still relatively low for listed companies in China. The average M&A is 0.390, which means that 39% of the sample has an M&A event. The average FollowCN is 17.23, which means that each analyst follows an average of 17.23 companies, which is a large amount.

[Insert Table 3 here]

## 6. Results

### 6.1 Results for hypothesis H1

Table 4 shows the regression analysis results for the relationship between company investment behavior and analyst recommendations. Column (1) is the result for the relationship between a company's overall investment level and analyst recommendations. Column (2) is the result for the relationship between a company's R&D level and analyst recommendations. Column (3) is the result for the relationship between a company's M&A behavior and analyst recommendations. The coefficients on the overall investment level, R&D level and M&A event variables are significantly positive at the 1% level whether using the current or lagged period. This verifies hypothesis H1a that the overall investment level, R&D level and M&A behavior of companies are significantly positively correlated with analyst recommendations, indicating that analysts are optimistic about investment behaviors that create uncertainty for companies. In terms of control variables, the coefficient on the variable Star is significantly positive at the 5% level, indicating that star analysts in China are more inclined to issue optimistic recommendations. The coefficient on the

variable InstitutionS is negative but not significant, which indicates that the reputations of securities companies do not restrain analysts' optimism. The coefficients on the variables FundR, SponsorR and InstitutionS are all significantly positive at the 1% level, indicating that connections lead analysts to issue more optimistic recommendations. The coefficient on the variable LnAnalystE is negative but not significant, which indicates that the professional abilities of analysts do not restrain the optimistic tendency in recommendations and that the optimistic tendency is not the result of a lack of experience. The coefficient on the variable LnFollowCN is significantly negative at the 1% level; it is possible that analysts with large portfolios face less pressure from conflicts of interest and so can maintain their independence and issue objective recommendations. The coefficients on the variables ChROA, Volume and PB are all significantly positive at the 1% level, indicating that excellent companies obtain higher recommendations, in line with expectations. The coefficients on the variables InsiderOwn and InstOwn are both significantly positive at the 1% level, indicating that analysts likely face pressure from conflicts of interest to issue optimistic recommendations. The coefficient on the variable SOE is significantly negative at the 1% level. It is generally believed that state-owned enterprises suffer more from agency problems, so analysts give relatively negative recommendations, in line with expectations. The variable Size does not have a significant impact on analyst recommendations.

[Insert Table 4 here]

Table 5 shows the regression results for the impact of transparency. The significant positive correlations between the overall investment level, R&D level, M&A behavior and analyst recommendation exist only in the group with low information transparency. The positive correlations between lagged overall investment and M&A events and analyst recommendations also exists only in the group with low information transparency, though this is not the case for the correlation between lagged R&D level and analyst recommendations. This supports H1b; the optimistic tendency of analysts when evaluating corporate investment behavior only exists in the

case of low transparency companies, indicating that analysts might release optimistic recommendations in the face of the uncertainty caused by investment to obtain more private information in cases of low transparency.

[Insert Table 5 here]

6.2 Results for hypothesis H2

Table 6 shows the regression results for the relationship between analyst recommendations and the number of reports released by analysts. Column (1) is the result when not controlling for corporate investment behavior and columns (2), (3) and (4) are the results when controlling for the overall investment level, R&D level and M&A events, respectively. Analyst recommendations are significantly positively correlated with the number of analyst reports at the 1% level even when controlling for corporate investment behavior. This shows that analysts who issue higher recommendations get more private information from management, verifying hypothesis H2a. In terms of control variables, the coefficient on the variable Star is significant at the 1% level. Combined with the evidence that star analysts have higher recommendations, this means that star analysts are more likely to curry favor with management by issuing optimistic recommendations to get more private information. Of the connection variables, the FundR coefficient is significantly positive at the 1% level because analysts' reports mainly serve funds trading in their own brokerage. The coefficients on the variables LnAnalystE and LnFollowCN are significantly positive at the 1% level because these two variables measure the professional competence of the analysts and more competent analysts publish more reports. In terms of corporate characteristics, the coefficients on Size, PB, ChROA, Volume, InstOwn and InsiderOwn are all significantly positive. The SOE coefficient is significantly negative, possibly due to the low attention paid by analysts to state-owned enterprises.

[Insert Table 6 here]

Table 7 shows the regression results for the relationship between the number of reports released by analysts and the accuracy of analysts' earnings forecasts. Column (1) is the result when not considering corporate investment behavior, while

columns (2), (3) and (4) are the results when controlling for the overall investment level, R&D level and M&A events, respectively. There is a negative correlation between the number of analyst reports and the variable FcstAcc that is significant at the 1% level even after controlling for corporate investment behavior, indicating that analysts with a lot of private information have a lower margin of error in forecasting earnings. That is, their predictions are more accurate and hypothesis H2b is verified. In terms of control variables, the coefficient on the overall investment level is significantly positive because a high level of investment increases uncertainty for companies, making their earnings more difficult to predict. The R&D level coefficient is not significant, possibly because the R&D level of listed companies in China is low in general and R&D's impact on overall profits is small, so R&D does not affect the accuracy of analysts' predictions. The coefficient on M&A in the current year is significantly negative, as is the coefficient on lagged M&A, because although M&As increase uncertainty, companies must disclose consolidated statements when the M&A events occur and this provides analysts with earnings information and improves the accuracy of their forecasts. The coefficient on the variable Star is not significant, suggesting that star analysts have no special advantage in the accuracy of their earnings forecasts. The coefficient on the variable InstitutionS is significantly negative, indicating that the earnings forecasts of analysts of large securities firms are more accurate. Of the connection variables, only the FundR coefficient is significantly negative; this is because funds are the main service target of analysts, so analysts are more motivated to provide more accurate earnings forecasts. The coefficient on the variable LnAnalystE is significantly positive at the 10% level, suggesting that the earnings forecasts of experienced analysts are less accurate, which is an amazing result. The coefficient on the variables Size, PB and ChROA are all significantly negative because analysts work more for such companies to improve the accuracy of their earnings forecasts. The coefficient on the variable Volume is significantly positive because the uncertainty is greater for companies with more liquidity, which reduces prediction accuracy. The coefficient on the variable InstOwn is significantly negative, suggesting that pressure from institutional investors helps analysts improve

the accuracy of their forecasts.

[Insert Table 7 here]

6.3 Results for hypothesis H3

Table 8 shows the empirical results for the relationship between overall investment level and analyst recommendations grouped by connections. Table 9 shows the empirical results for the relationship between R&D level and analyst recommendations grouped by connections. Table 10 shows the empirical results for the relationship between M&A behavior and analyst recommendations grouped by connections. Columns (1) and (2) of each table are the regression result grouped by underwriting connection, columns (3) and (4) are the regression result grouped by proprietary connection and columns (5) and (6) are the regression result grouped by fund connection. The significant positive correlations between overall investment level, R&D and M&A behavior and analyst recommendations only exist in the analyst group without underwriting connections, the analyst group without proprietary connections and the analyst group without fund connections, which verifies hypotheses 3a, 3b and 3C, respectively.

This part uses three aspects of corporate investment behavior to draw the same conclusions for three kinds of connections, which fully demonstrates that analysts' optimistic recommendations when faced with the uncertainty caused by corporate investment behavior are not the result of conflicts of interest from connections.

[Insert Table 8 here]

[Insert Table 9 here]

[Insert Table 10 here]

## 7.Further research and robustness testing

7.1 Corporate investment behavior, analyst following and analysts' private information level: firm-level analysis

We show at the analyst level that the uncertainty caused by corporate investment behavior encourages analysts to issue optimistic recommendations to curry favor with

management for private information. Analysts improve their reputation by competing in information discovery and information interpretation to serve customers. The uncertainty caused by corporate investment behavior creates conditions for analysts to compete with their expertise in obtaining and understanding information. This means that investments are expected to lead to more analysts following the investing company. Analysts use both public and private information. Public information represents the common information acquired by all analysts following the company. Private information is unique information owned by only one or a few analysts. When faced with the uncertainty caused by a company's investment behavior, analysts can use their own channels to find out the details of the company's investment in a timely manner. Analysts can also make full use of their expertise to evaluate how the uncertainty affects the company's future cash flow and thus affects the company's value. Both aspects are reflected in the differences between different analysts' recommendations. As a result, corporate investment behavior generates more private information.

Barron et al. (1998) decompose analysts' earnings forecast errors into two parts, uncertainty and consistency, and develop a method to measure the level of private information among analysts following a company. The formula is

$$\mathrm{PI} = \frac{D}{\left(1 - \frac{1}{N}\right) D + SE}$$

where

$$\mathrm{D} = \sum_{i=1}^{n} (FC_i - \overline{FC})^2 / (N - 1)$$

$$\mathrm{SE} = (\overline{FC} - EPS)^2$$

$FC_i$ refers to the company's earnings per share as predicted by analyst i, $\overline{\mathrm{FC}}$ refers to the average of the company's earnings per share as predicted by all analysts following the company and EPS is the company's actual earnings per share.

This section examines whether corporate investment behavior attracts more analyst coverage and increases the level of private information among analysts at the

firm level. The empirical results are shown in Tables 11 and 12. In Table 11, the dependent variable is the natural logarithm of the number of analysts following the company; because at least two analysts are required in the regression of Table 12 to measure the level of private information among analysts following a company, Table 11 excludes an observation with only two analysts for consistency. Table 11 shows that the coefficients on the variables Invst, R&D and M&A are significantly positive; the coefficients on all lagged variables except R&D are also significantly positive, indicating that corporate investment behavior attracts more analysts to follow the investing company. In terms of control variables, the coefficients on Size, PB, Volume, InsiderOwn and InstOwn are significantly positively correlated with analyst coverage at the 1% level. The coefficient on Return is significantly negative at the 1% level, suggesting that analysts avoid following companies whose share prices have risen too much. The coefficient on the variable SOE is also significantly negative at the 1% level, indicating that analysts do not like to follow state-owned enterprises.

[Insert Table 11 here]

In Table 12, the dependent variable is the level of private information. The coefficients on the variables Invst, R&D and M&A are all significantly positive, indicating that corporate investment behavior increases analysts' private information in the current year. The coefficients on the lagged versions of Invst, R&D and M&A are not significant, which indicates that private information among analysts gradually disappears over time. In terms of control variables, PB, InsiderOwn and InstOwn significantly increase analysts' private information. This is because more private information can be tapped by growing companies, while insider and institutional investors' ownership put pressure on analysts to tap more private information. The coefficient on the variable ABSChROA is significantly negative because China's regulations require that when a company's performance changes by more than a certain amount, management must make performance forecasts, reducing the private information of analysts.

[Insert Table 12 here]

7.2 Analysts' optimism about corporate investment behavior and the overvaluation of stock prices

Analysts give stronger recommendations to companies with higher overall investment levels, higher R&D levels and M&A events. Models (4) and (5) test whether this optimistic tendency of analysts impacts market efficiency. Model (4) adds investment behavior and analyst recommendations to a regression model of market returns and performance changes and controls for scale effects. Model (5) is based on model (4) but adds an interaction term between firm investment behavior and analyst recommendations. Comparing the results of the two models allows us to analyze the impact of analyst recommendations on the relationship between corporate investment behavior and market returns.

$$\begin{aligned}\text{Return} &= \delta_0 + \delta_1 \text{Invst(or R \& D)(or M \& A)} + \delta_2 AverageRank \\ &+ \delta_3 \text{Invst\_LstYear(or R \& D\_LstYear)(or M \& A\_LstYear)} + \delta_4 ChROA \\ &+ \delta_5 Size + \sum Ind + \sum Year + \varepsilon\end{aligned} \tag{4}$$

$$\begin{aligned}\text{Return} &= \phi_0 + \phi_1 \text{Invst(or R \& D)(or M \& A)} + \phi_2 AverageRank \\ &+ \phi_3 \text{Invst(or R \& A)(or M \& A)} * \text{AverageRank} \\ &+ \phi_4 \text{Invst\_LstYear(or R \& D\_LstYear)(or M \& A\_LstYear)} \\ &+ \phi_5 ChROA + \phi_6 Size + \sum Ind + \sum Year + \varepsilon\end{aligned} \tag{5}$$

Table 13 presents the empirical results. Columns (1) and (2) show the results for optimistic recommendations and overall investment levels, columns (3) and (4) show the result for optimistic recommendations and R&D level and columns (5) and (6) show the result for optimistic recommendations and M&A behavior. Analyst recommendations are significantly positively correlated with market returns at the 1% level, suggesting that analysts' strong recommendations significantly improve the market returns of a company's stock. The regression results of column (1) show that the market returns in a given year are significantly positively correlated with the overall investment level of the same year at the 1% level. The regression results of column (3) show that the R&D level and market returns of the same year are significantly positively correlated at the 1% level. The results of column (5) show that the market returns of one year are significantly positively correlated with the M&A events of the same year at the 1% level. This shows that a company's investment

behavior significantly improves the market returns of its stock. Next, we look at the regression results of columns (2), (4) and (6), which include the interaction term. In column (2), the coefficient on the interaction term is significantly positive at the 1% level, while the sign on the coefficient on the overall investment level becomes significantly negative at the 10% level. In column (4), the coefficient on the interaction item is positive but not significant, while the coefficient on R&D becomes negative and is no longer significant. In column (6), the coefficient on the interaction item is significantly positive at the 1% level, while the coefficient on M&A is significantly negative at the 1% level. These results indicate that the positive correlation between corporate investment behavior and market returns acts through analysts' optimistic recommendations. This shows that analysts' optimistic responses to corporate investment behavior lead to an overreaction in stock prices and reduce market efficiency.

[Insert Table 13 here]

7.4 Robustness test

In our main analysis, we divide analysts' recommendations into five categories. When analyst recommendations are dependent variables, we use an ordered logic regression model. For the sake of robustness, we redo the analysis with analyst recommendations divided into two groups. A recommendation is in the high group when it is a 5 ("strong buy") and in the low group when it is anything else. We use a logit or probit model to repeat the regressions. This alternate classification does not change the conclusions.

In testing hypothesis H2, we use the natural logarithm of the number of reports released by analysts as the measure of the private information of analysts, but there are many factors that affect the number of reports released by analysts, meaning that this measure might not be a good measure of the private information of analysts. As a robustness test, we measure the private information of an analyst in terms of the relative number of reports released by the analyst (the number of reports released by the analyst for a company minus the average number of reports released by all

analysts following the company). The results are shown in Tables 14 and 15, with no change in conclusions.

[Insert Table 14 here]

[Insert Table 15 here]

## 7. Conclusion

Analysts' optimism and the motivations for their optimism are hot topics in academic research. In this paper, we study the optimism of analyst recommendations under the specific condition of firm investment behavior that leads to uncertainty, testing two possible hypotheses for analysts' motivations. One hypothesis is that analysts are currying favor with management to obtain private information and the second hypothesis is that analysts' optimism arises from conflicts of interest from connections. We find that overall investment level, R&D level and M&A behavior are all significantly positively correlated with analyst recommendations, showing that analysts tend to be optimistic about corporate investment behavior. However, this optimistic tendency exists only for companies with low information transparency, suggesting that analysts' optimism is a strategy to curry favor with management to obtain private information. In addition, we find that the stronger the recommendation, the more research reports are released, and that the more research reports released, the more accurate earnings forecasts are, further supporting the hypothesis that analysts curry favor with management to obtain private information by issuing optimistic recommendations to improve the accuracy of their earnings forecasts. This is in line with the logic that the difficulty of earnings forecasting increases under the uncertainty caused by corporate investment behavior, increasing the demand for private information. We then divide the analysts into two groups in three ways according to their underwriting connections, proprietary connections and fund connections. Empirical results show that the positive correlations between overall investment level, R&D level and M&A behavior and the strength of analyst recommendations exist only in the unconnected groups. This is evidence against the hypothesis of conflicts of interest from connections causing the optimism.

Further research at the firm level shows that overall investment level, R&D level and M&A behavior significantly increase the level of private information among analysts following the company and encourage more analysts to follow the company, which provides more evidence that analysts are currying favor with management to obtain private information. We also study the economic consequences of analysts' optimism about corporate investment behavior, finding that it leads to overreactions in the market and overvaluation of a company's stock price. This reduces market efficiency.

Many studies focus on how conflicts of interest cause analysts' optimism. The results from studying what happens in the condition of uncertainty caused by corporate investment behavior do not support such a conflict of interest hypothesis, instead supporting the hypothesis that agents curry favor with management to obtain private information. This study deepens our understanding of analysts' motivations and behavior.

**References**


Agrawal, A., and Chen, M., 2008. Do Analyst Conflicts Matter? Evidence from Stock Recommendations. Journal of Law and Economics 51 (3): 503-537.

Ahn, H., Cai, J., Hamao, Y., and Ho, R.Y.K., 2005. Adverse selection, Brokerage Coverage, and Trading Activity on the Tokyo Stock Exchange. Journal of Banking and Finance 29: 1483-1508.

Asquith，Paul，Anne，B.，and Joseph，P.W.，2005. Performance Pricing in Bank Debt Contracts. Journal of Accounting and Economics 40 (1-3): 101-128.

Barron, O.E., Byard, D., Kile, C., and Riedl, E.J., 2002. High-technology Intangibles and Analysts' Forecasts. Journal of Accounting Research. 40: 289-312.

Barron, O.E., Kim, O., Lim, S.C., and Stevens, D.E., 1998. Using Analysts' Forecasts to Measure Properties of Analysts' Information Environment. The Accounting Review 73: 421-433.

Barron, O., Kile, C., and O'Keefe, T., 1999. MD&A Quality as Measured by the SEC and Analysts' Earnings Forecasts. Contemporary Accounting Research 16: 75-109.

Barth, M.E., Kasznik, R., Mc Nichols, M.F., 2001. Analyst Coverage and Intangible Assets. Journal of Accounting Research 39: 1-34.

Bhushan, R., 1989. Firm Characteristics and Analyst Following. Journal of Accounting and Economics 11: 255-274.

Bowen, R., Davis, A., and Matsumoto, D., 2002. Do Conference Calls Affect Analysts' Forecasts? The Accounting Review 77: 285-316.

Bradshaw, M.T., 2011. Analysts' Forecasts: What Do We Know After Decades of

Work? Working paper, Boston College.
Brennan, M.J., and Subrahmanyam, A., 1995. Investment Analysis and Price Formation in Securities Markets. Journal of Financial Economics 38: 361-381.
Bruner, 2002. Does M&A Pay? A Survey of Evidence for The Decision-Maker. Journal of Applied Finance, Spring/Summer: 48-68.
Byard，D.，and Kenneth，W.S.，2003. The Informational Role of Financial Analysts: Interpreting Public Disclosures. Journal of Financial Transformation 11: 143-148.
Cao, S., and Zhu, H., 2011, Securities Firms' Proprietary Business and Analyst Optimism. Management World 7: 20-30. (in Chinese)
Chung, K.H., Mc-Inish, T.H., Wood, R.A., and Wyhowski, D.J., 1995. Production of Information, Information Asymmetry, and the Bid-ask Spread: Empirical Evidence from Analysts' Forecasts. Journal of Banking and Finance 19: 1025-1046.
Conrad, J., Cornell, B., Landsman, W., and Rountree, B., 2006. How do Analyst Recommendations Respond to Major News? Journal of Financial and Quantitative Analysis 41: 25-50.
Cowen, A., Groysberg, B., and Healy, P., 2006. Which Types of Analyst Firms are More Optimistic? Journal of Accounting and Economics 41 (1-2): 119-146.
Das,S., Levine,C.B., and Sivaramakrishnan, K., 1998. Earnings Predictability and Bias in Analysts' Earnings Forecasts. The Accounting Review 73 (2): 277-294.
Denis, D., Denis, D., and Sarin, A., 1994. The Information Content of Dividend Changes: Cash Flow Signaling, Over-investment, and Dividend Clienteles. Journal of Financial and Quantitative Analysis 29: 567-587.
Diamond, D.W., 1985. Optimal Release of Information by Firms. Journal of Finance 40: 1071-1094.
Duru, A., and Reeb, D., 2002. International Diversification and Analysts' Forecasts' Accuracy and Bias. The Accounting Review 77: 415-433.
Ely, K., and Mande, V., 1996. The Interdependent Use of Earnings and Dividends in Financial Analysts' Earnings Forecasts. Contemporary Accounting Research 13: 435-456.
Firth, M., Lin, C., Liu, P. and Xuan, Y., 2013. The Client is King: Do Mutual Fund Relationships Bias Analyst Recommendations? Journal of Accounting Research 51(1): 165-200.
Francis, J., and Philbrick, D., 1993. Analysts' Decisions as Products of a Multi-task Environment. Journal of Accounting Research 31 (2): 216-230.
Gu, Z., and Xue, J., 2008. The Superiority and Disciplining Role of Independent Analysts. Journal of Accounting and Economics 45 (2-3): 289-316.
Gu, Z., Li, G, Li, Z. and Yang, Y., 2012, Monitors or Predators: The Influence of Institutional Investors on Sell-side Analysts, The Accounting Review 88 (1): 137-169.
Jackson, A., 2005. Trade Generation, Reputation, and Sell-side Analysts. Journal of Finance 60 (2): 673-717.
Jacob, J., Rock, S., and Weber, D., 2008. Do Non-investment Bank Analysts Make

Better Earnings Forecasts? Journal of Accounting, Auditing and Finance 23 (1): 23-61.

Haw, I., Jung, K., and Ruland, W., 1994. The Accuracy of Financial Analysts' Forecasts after Merges. Journal of Accounting, Auditing and Finance 9: 465-483.

Healy, P., Hutton, A., and Palepu, K., 1999. Stock Performance and Intermediation Changes Surrounding Sustained Increases in Disclosure. Contemporary Accounting Research 16: 485-520.

Hong, H., Kubik, J., and Solomon, D., 2000. Security Analysts' Career Concerns and Herding of Earnings Forecasts. Rand Journal of Economics 31: 121-144.

Lang, M., and Lundholm, R., 1996. Corporate Disclosure Policy and Analyst Behavior. The Accounting Review 71: 467-492.

Lim, T., 2001. Rationality and Analysts' Forecast Bias. Journal of Finance 56 (1): 369-385.

Lin, H., and McNichols, M., 1998. Underwriting Relationships, Analysts' Earnings Forecasts and Investment Recommendations. Journal of Accounting and Economics 25: 101-127.

McNichols, M., and O'Brien, P. C., 1997. Self-selection and Analyst Coverage. Journal of Accounting Research 35 (Supplement): 167-199.

Mehran, H., and Stulz, R. M., 2007. The Economics of Conflicts of Interest in Financial Institutions. Journal of Financial Economics 85 (2): 267-296.

Michaely, R., and Womack. K., 1999. Conflict of Interest and Credibility of Underwriter Analyst Recommendations. Review of Financial Studies 12 (4): 653-686.

Mikhail, M., Walther, B., and Willis, R., 1999, Does Forecast Accuracy Matter to Security Analysts? The Accounting Review 74: 185-200.

Moyer, R.C., Chatfield, R.E., and Sisneros, P.M., 1989. Security Analyst Monitoring Activity: Agency Costs and Information Demands. Journal of Financial and Quantitative Analysis 24: 503-512.

O'Brien, McNichols, M., and Lin, M. H., 2005. Analyst Impartiality and Investment Banking Relationships. Journal of Accounting Research 43 (4): 623-650.

O'Brien, P. C., and Bhushan, R., 1990. Analysts Following and Institutional Ownership. Journal of Accounting Research (Supplement): 55-76.

Previts, G., Bricker, R., Robinson, T., and Young, S., 1994. A Content Analysis of Sell-side Financial Analyst Company Reports. Accounting Horizons 8: 55-70.

Ramnath, S., Rock, S. and Shane, P., 2008. The Financial Analyst Forecasting Literature: A Taxonomy with Suggestions for Further Research. International Journal of Forecasting 24: 34-75.

Rogers, R., Grant, J., 1997. Content Analysis of Information Cited in Reports of Sell-side Financial Analysts. Journal of Financial Statement Analysis 3: 17-30.

Shambaugh, D., 2016. China's Future. First Edition, Publication Cambridge, UK. Malden, MA: Polity Press.

Sharma, D.S. and Ho, J., 2002. The Impact of Acquisitions on Operating Performance: Some Australian Evidence. Journal of Business Finance & Accounting 29 (1-2): 155-200.

Van Ness, B.F., Van Ness, R.A., and Warr, R.S., 2001. How Well do Adverse Selection Components Measure Adverse Selection. Financial Management 30: 77-98.

Williams, P., 1996. The Relation Between a Prior Earnings Forecast by Management and Analyst Response to A Current Management Forecast. The Accounting Review 71: 103-113.

Zhu, A.D., Kotz, D.M., 2011. The Dependence of China's Economic Growth on Exports and Investment. Review of Radical Political Economics 43(1): 9-32.

**Appendix. Definition of variables**

| Variable | Definition |
|---|---|
| Rank | Rating of analyst last stock recommendation in the current year. 5="Strong Buy," 4="Buy," 3="Neutral," 2="Sell," 1="Strong Sell." |
| LnReportN | The natural logarithm of the number of research reports issued by an analyst for a company in a given year. |
| FcstAcc | Analyst earnings forecast accuracy, defined as the absolute value of the difference between an analyst's earnings per share forecast and the company's actual earnings per share divided by the absolute value of the company's actual earnings per share. |
| Invst | Corporate overall investment level in the current year. Invst= (Cash paid for acquisition and construction of fixed assets, intangible assets and other long term assets + cash paid by subsidiaries and other business units + cash paid for investment - net cash recovered for disposal of fixed assets, intangible assets and other long term assets - net cash received for disposal of subsidiaries and other business units - cash received for recovery of investment - current depreciation expenses)/ total assets at the beginning of the period. |
| Invst_LstYear | Corporate overall investment level last year. |
| R&D | R&D level, = (Company's net intangible assets for the current year - net intangible assets for the previous year)/total assets at the beginning of the period. The company's intangible assets include patents, non-patented technologies, trademarks, copyrights and development expenditures. |
| R&D_LstYear | R&D level last year. |
| M&A | An indicator variable equal to1 if the company has completed M&A activities in the given year and 0 otherwise. |
| M&A_LstYear | An indicator variable equal to 1 if the company completed M&A activities in the previous year and 0 otherwise. |
| Star | Analyst reputation dummy variable equaling 1 if the analyst is a star analyst as selected by New Wealth magazine in the given year and 0 otherwise. |
| InstitutionS | Dummy variable for stock company reputation equaling 1 if the size of the securities company where the analyst works is ranked in the top four in a given year and 0 otherwise. |
| SponsorR | Underwriting connection dummy variable equaling 1 if the analyst's securities company has been an underwriter of the rated company in the past 5 years and 0 otherwise. |
| InstitutionR | Proprietary connection dummy variable equaling 1 if the stock of the rated company is held in heavy positions in the third quarter of the given year by the securities company where the analyst works and 0 otherwise. |

| | |
|---|---|
| FundR | Fund connection dummy variable equaling 1 if the stock of the rated company is held in heavy positions by a fund in the first half of the year and the fund divides trading commissions in the securities company where the analyst works and 0 otherwise. |
| LnAnalystE | Analyst experience, defined as the natural logarithm of the number of quarters since the analyst made their first earnings forecast to the end of this year plus 1. |
| LnFollowCN | Analyst workload, defined as the natural logarithm of the number of listed companies followed by the analyst in the given year. |
| Size | Company size, defined as the natural logarithm of the company's total assets at the end of the given year. |
| PB | The company's stock price at the end of this period is divided by net assets per share to measure the growth of the company. |
| ChROA | Profit change, defined as the company's current ROA minus the previous year's ROA. |
| Volume | Stock liquidity, defined as the natural logarithm of the average daily turnover of the company's stock. |
| InsiderOwn | Insider ownership in the company. |
| InstOwn | Institutional investor ownership in the company. |
| SOE | The property right of a company, equal to 1 for state-owned enterprises and 0 otherwise. |
| Transparency | Transparency dummy variable equaling 1 if the company's information disclosure in the given year is rated Class A by the stock exchange and 0 otherwise. |
| Year, Industry | Annual Control Variables and Industry Control Variables |

**Figure 1 Investment and profit of listed companies in China**

This figure shows the annual average investment and earnings of Chinese listed companies from 2000 to 2015. The investment level of Chinese listed companies has been growing but the profit level has not been improving correspondingly. Especially after 2011, the investment level of Chinese listed companies has increased rapidly but profits have hardly changed.

## Table 1 The operating income and composition of Chinese securities companies for the period from 2012 to 2016

This table shows the operating income and composition of Chinese securities companies from 2012 to 2016. The main sources of income are agency securities trading, own securities investment, underwriting and margin financing. Securities companies have a strong motivation to maintain these businesses.

| | 2016 | 2015 | 2014 | 2013 | 2012 |
|---|---|---|---|---|---|
| Operating Income (RMB 100 million) | 3279.94 | 5751.55 | 2602.84 | 1592.41 | 1294.71 |
| Agency securities trading business (%) | 32.10 | 46.79 | 40.32 | 47.68 | 38.93 |
| Investment consulting business (%) | 1.54 | 0.78 | 0.86 | 1.62 | 0.89 |
| Underwriting business (%) | 15.85 | 6.84 | 9.23 | 8.08 | 13.70 |
| Financial advisory business (%) | 5.00 | 2.40 | 2.66 | 2.81 | 2.74 |
| Asset management business (%) | 9.04 | 4.78 | 4.78 | 4.41 | 2.07 |
| Own securities investment business (%) | 17.33 | 24.58 | 27.29 | 19.19 | 22.41 |
| Margin financing business (%) | 11.64 | 10.28 | 17.14 | 11.59 | 4.06 |
| Others (%) | 7.49 | 2.14 | 1.24 | 4.62 | 15.19 |
| Net Profit ($100 million) | 1234.45 | 2447.63 | 965.54 | 440.21 | 329.30 |
| Net Profit Rate (%) | 37.64 | 42.56 | 37.1 | 27.64 | 27.01 |

## Table 2 The type and annual distribution of analysts' recommendations

This table reports the type and annual distribution of analysts' recommendations. Analysts' recommendations become more optimistic on average across time, except for 2007 and 2012. The higher recommendations in 2007 may be the result of a bull market, while in 2012 there was a brief decline due to a bear market. Analysts are less and less likely to issue negative recommendations (including "sell," "strong sell" and "neutral") and the proportion of negative recommendations declines from 24.9% in 2008 to 3.5% in 2015. The percentage of "strong buy" recommendations increases from 20.7% in 2008 to 53.1% in 2015. There is an increasingly optimistic trend in Chinese analyst recommendations.

| Year | Number | | | | | | Percent | | | Average |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | Total | <=3 | 4 | 5 | Rating |
| 2007 | 5 | 7 | 208 | 945 | 564 | 1729 | 12.7% | 54.7% | 32.6% | 4.189 |
| 2008 | 25 | 24 | 853 | 1,972 | 751 | 3,625 | 24.9% | 54.4% | 20.7% | 3.938 |
| 2009 | 25 | 8 | 871 | 2,672 | 1,146 | 4,722 | 19.1% | 56.6% | 24.3% | 4.039 |
| 2010 | 15 | 1 | 655 | 3,193 | 1,756 | 5,620 | 11.9% | 56.8% | 31.2% | 4.188 |
| 2011 | 8 | 0 | 466 | 2,568 | 1,539 | 4,581 | 10.3% | 56.1% | 33.6% | 4.229 |
| 2012 | 14 | 5 | 551 | 2,306 | 1,324 | 4,200 | 13.6% | 54.9% | 31.5% | 4.172 |
| 2013 | 8 | 4 | 341 | 2,265 | 1,461 | 4,079 | 8.7% | 55.5% | 35.8% | 4.268 |
| 2014 | 7 | 5 | 299 | 2,790 | 2,061 | 5,162 | 6.0% | 54.0% | 39.9% | 4.335 |
| 2015 | 9 | 2 | 202 | 2,655 | 3,249 | 6,117 | 3.5% | 43.4% | 53.1% | 4.493 |
| Total | 116 | 56 | 4,446 | 21,366 | 13,851 | 39,835 | 11.6% | 53.6% | 34.8% | 4.225 |

## Table 3 Descriptive statistics of the main variables

This table reports the descriptive statistics of the main variables in this paper. The average value of Invst is 0.078, which shows that the annual average proportion of new investment in the total assets of listed companies in China is 7.8% per year. The average R&D is 0.011 and its median is 0.002, which means that R&D investment is still relatively low for listed companies in China. The average M&A is 0.390, which means that 39% of the sample has an M&A event in a given year. The average FollowCN is 17.23, which means that each analyst follows 17.23 companies on average, which is a relatively large amount.

| Variable | Num. | Mean | Min | Max | STD | P25 | P50 | P75 |
|---|---|---|---|---|---|---|---|---|
| *Rank* | 39835 | 4.225 | 1 | 5 | 0.664 | 4 | 4 | 5 |
| *LnReportN* | 39835 | 1.684 | 0 | 5.11 | 0.845 | 1.099 | 1.609 | 2.197 |
| *FcstAcc* | 32504 | 2.011 | 0 | 37.650 | 5.185 | 0.128 | 0.440 | 1.498 |
| *Invst* | 39835 | 0.078 | -0.093 | 0.540 | 0.101 | 0.013 | 0.051 | 0.113 |
| *Invst_LstYear* | 39835 | 0.079 | -0.094 | 0.488 | 0.099 | 0.014 | 0.052 | 0.115 |
| *R&D* | 39835 | 0.011 | -0.029 | 0.152 | 0.025 | -0.000 | 0.002 | 0.012 |
| *R&D_LstYear* | 39835 | 0.011 | -0.025 | 0.165 | 0.027 | -0.000 | 0.002 | 0.013 |
| *M&A* | 39835 | 0.390 | 0 | 1 | 0.488 | 0 | 0 | 1 |
| *M&A_LstYear* | 39835 | 0.376 | 0 | 1 | 0.484 | 0 | 0 | 1 |
| *Star* | 39835 | 0.074 | 0 | 1 | 0.262 | 0 | 0 | 0 |
| *InstitutionS* | 39835 | 0.160 | 0 | 1 | 0.367 | 0 | 0 | 0 |
| *SponsorR* | 39835 | 0.007 | 0 | 1 | 0.085 | 0 | 0 | 0 |
| *InstitutionR* | 39835 | 0.003 | 0 | 1 | 0.057 | 0 | 0 | 0 |
| *FundR* | 39835 | 0.055 | 0 | 1 | 0.227 | 0 | 0 | 0 |
| *AnalystE* | 39835 | 9.315 | 0 | 47.790 | 8.226 | 3.300 | 6.490 | 12.920 |
| *FollowCN* | 39835 | 17.230 | 1 | 225 | 17.540 | 8 | 13 | 21 |
| *Size* | 39835 | 22.720 | 20.210 | 26.10 | 1.296 | 21.760 | 22.550 | 23.480 |
| *PB* | 39835 | 3.849 | 0.678 | 15.35 | 2.771 | 1.902 | 3.085 | 4.859 |
| *ChROA* | 39835 | -0.003 | -0.142 | 0.115 | 0.035 | -0.017 | -0.001 | 0.011 |
| *Volume* | 39835 | 18.670 | 15.580 | 22.77 | 0.989 | 17.950 | 18.650 | 19.330 |
| *InsiderOwn* | 39835 | 0.043 | 0 | 0.490 | 0.107 | 0 | 0 | 0.002 |
| *InstOwn* | 39835 | 0.507 | 0.017 | 0.901 | 0.226 | 0.337 | 0.532 | 0.687 |
| *SOE* | 39835 | 0.574 | 0 | 1 | 0.495 | 0 | 1 | 1 |

## Table 4 Relationship between corporate investment behavior and analyst recommendation

This table shows the regression analysis results for hypothesis H1a. Ordered logit regressions are conducted with standard errors clustered by analyst. Z statistics modified by heteroscedasticity are reported in parentheses. *, ** and *** represent significance at the 10%, 5% and 1% levels, respectively. All variables are defined in the Appendix.

| VARIABLES | (1) | (3) | (2) |
|---|---|---|---|
| **Invst** | **0.840*** ** | | |
| | **(5.942)** | | |
| **Invst LstYeat** | **0.453*** ** | | |
| | **(4.109)** | | |
| ***R&D*** | | **1.681*** ** | |
| | | **(3.546)** | |
| ***R&D LstYear*** | | **1.819*** ** | |
| | | **(5.412)** | |
| ***M&A*** | | | **0.0926*** ** |
| | | | **(4.450)** |
| ***M&A LstYear*** | | | **0.0792*** ** |
| | | | **(3.759)** |
| *Star* | 0.275** | 0.276** | 0.275** |
| | (2.409) | (2.435) | (2.420) |
| *InstitutionS* | -0.194 | -0.197 | -0.198 |
| | (-1.572) | (-1.594) | (-1.611) |
| *SponsorR* | 0.582*** | 0.590*** | 0.601*** |
| | (4.177) | (4.220) | (4.320) |
| *InstitutionR* | 0.814*** | 0.797*** | 0.794*** |
| | (4.303) | (4.220) | (4.216) |
| *FundR* | 0.503*** | 0.511*** | 0.513*** |
| | (6.605) | (6.672) | (6.767) |
| *LnAnalystE* | -0.0356 | -0.0359 | -0.0357 |
| | (-0.877) | (-0.888) | (-0.878) |
| *LnFollowCN* | -0.164*** | -0.165*** | -0.166*** |
| | (-6.871) | (-6.892) | (-6.935) |
| *Size* | 0.0366* | 0.0357 | 0.0352 |
| | (1.705) | (1.643) | (1.627) |
| *PB* | 0.0367*** | 0.0377*** | 0.0383*** |
| | (5.383) | (5.547) | (5.611) |
| *ChROA* | 4.931*** | 4.697*** | 4.595*** |
| | (12.08) | (11.21) | (10.90) |
| *Volume* | 0.172*** | 0.178*** | 0.177*** |
| | (6.209) | (6.375) | (6.385) |
| *InsiderOwn* | 0.659*** | 0.745*** | 0.746*** |
| | (5.173) | (5.788) | (5.782) |
| *InstOwn* | 0.744*** | 0.770*** | 0.757*** |
| | (12.40) | (12.76) | (12.55) |
| *Soe* | -0.268*** | -0.291*** | -0.285*** |
| | (-10.27) | (-11.16) | (-10.75) |
| Constant | Yes | Yes | Yes |
| Industry, Year | Yes | Yes | Yes |
| Obs. | 39,835 | 39,835 | 39,835 |
| Pseudo $R^2$ | 0.0584 | 0.0576 | 0.0575 |

## Table 5 The impact of transparency on the relationship between corporate investment behavior and analyst recommendation

This table shows the regression analysis results for hypothesis H1b. Ordered logit regressions are conducted with standard errors clustered by analyst. Z statistics modified by heteroscedasticity are reported in parentheses. *, ** and *** represent significance at the 10%, 5% and 1% levels, respectively. All variables are defined in the Appendix.

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| VARIABLES | Transparen | Transparency=0 | Transparency=1 | Transparency=0 | Transparency=1 | Transparency=0 |
| **Invst** | **0.324** | **0.985*** ** | | | | |
| | **(1.005)** | **(5.209)** | | | | |
| **Invst LstYear** | **0.464** | **0.686*** ** | | | | |
| | **(1.566)** | **(3.793)** | | | | |
| ***R&D*** | | | **2.177** | **2.158*** ** | | |
| | | | **(1.512)** | **(3.566)** | | |
| ***R&D LstYear*** | | | **2.020** ** | **1.951*** ** | | |
| | | | **(2.357)** | **(3.091)** | | |
| ***M&A*** | | | | | **0.0997** | **0.0767** ** |
| | | | | | **(1.464)** | **(2.448)** |
| ***M&A LstYear*** | | | | | **0.0132** | **0.0704*** |
| | | | | | **(0.187)** | **(1.749)** |
| *Star* | 0.390** | 0.303*** | 0.388*** | 0.303*** | 0.388*** | 0.303*** |
| | (3.211) | (2.840) | (3.204) | (2.836) | (4.312) | (2.830) |
| *InstitutionS* | -0.258 | -0.183 | -0.261 | -0.189 | -0.262*** | -0.191 |
| | (-1.532) | (-1.398) | (-1.541) | (-1.435) | (-3.774) | (-1.459) |
| *SponsorR* | 0.545* | 0.721*** | 0.549* | 0.722*** | 0.555* | 0.736*** |
| | (1.835) | (4.730) | (1.852) | (4.758) | (1.717) | (4.862) |
| *InstitutionR* | 0.982** | 0.457 | 0.973** | 0.460 | 0.979** | 0.473 |
| | (2.155) | (1.414) | (2.180) | (1.421) | (2.109) | (1.463) |
| *FundR* | 0.424** | 0.438*** | 0.430*** | 0.445*** | 0.428*** | 0.446*** |
| | (3.895) | (4.529) | (3.888) | (4.591) | (4.463) | (4.642) |
| *LnAnalystE* | 0.0288 | -0.0439 | 0.0282 | -0.0462 | 0.0290 | -0.0461 |
| | (0.568) | (-0.901) | (0.555) | (-0.965) | (0.828) | (-0.950) |
| *LnFollowCN* | -0.189* | -0.177*** | -0.189*** | -0.178*** | -0.191*** | -0.178*** |
| | (-4.471) | (-6.362) | (-4.438) | (-6.524) | (-5.822) | (-6.452) |
| *Size* | 0.185** | 0.111*** | 0.178*** | 0.113*** | 0.187*** | 0.110*** |
| | (3.576) | (3.332) | (3.421) | (3.408) | (3.260) | (3.332) |
| *PB* | 0.0537* | 0.0474*** | 0.0520*** | 0.0467*** | 0.0548*** | 0.0463*** |
| | (3.313) | (4.579) | (3.205) | (4.446) | (3.035) | (4.465) |
| *ChROA* | 6.105** | 4.493*** | 5.980*** | 4.301*** | 5.859*** | 4.165*** |
| | (6.572) | (7.622) | (6.572) | (7.334) | (5.653) | (7.106) |
| *Volume* | 0.0594 | 0.0694* | 0.0650 | 0.0779* | 0.0612 | 0.0763* |
| | (1.033) | (1.647) | (1.135) | (1.839) | (0.794) | (1.804) |
| *InsiderOwn* | 0.623* | 0.744*** | 0.671** | 0.811*** | 0.654 | 0.821*** |
| | (1.921) | (4.350) | (2.064) | (4.685) | (1.515) | (4.755) |
| *InstOwn* | 0.609** | 0.654*** | 0.669*** | 0.686*** | 0.630*** | 0.665*** |
| | (3.523) | (6.276) | (3.884) | (6.618) | (2.728) | (6.359) |
| *Soe* | -0.231* | -0.253*** | -0.240*** | -0.275*** | -0.253*** | -0.263*** |
| | (-2.783) | (-4.787) | (-2.862) | (-5.179) | (-2.602) | (-4.997) |
| Constant | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry, Year | Yes | Yes | Yes | Yes | Yes | Yes |
| Obs. | 6,697 | 13,077 | 6,697 | 13,077 | 6,697 | 13,077 |
| Pseudo $R^2$ | 0.0736 | 0.0676 | 0.0738 | 0.0659 | 0.0735 | 0.0655 |

## Table 6 Relationship between analyst recommendations and the number of reports released by analysts

This table shows the regression analysis results for hypothesis H2a. OLS regressions are conducted with standard errors clustered by analyst and firm. T statistics modified by heteroscedasticity are reported in parentheses. *, ** and *** represent significance at the 10%, 5% and 1% levels, respectively. All variables are defined in the Appendix.

| VARIABLES | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| **Rank** | **0.142*** ** | **0.140*** ** | **0.142*** ** | **0.142*** ** |
| | **(17.15)** | **(17.05)** | **(17.13)** | **(17.08)** |
| Invst | | 0.139*** | | |
| | | (3.211) | | |
| Invst LstYear | | 0.0951** | | |
| | | (2.099) | | |
| *R&D* | | | -0.0847 | |
| | | | (-0.620) | |
| *R&D LstYear* | | | 0.0267 | |
| | | | (0.224) | |
| *M&A* | | | | -0.00943 |
| | | | | (-1.161) |
| *M&A LstYear* | | | | 0.0146* |
| | | | | (1.898) |
| *Star* | 0.161*** | 0.161*** | 0.161*** | 0.161*** |
| | (4.515) | (4.516) | (4.518) | (4.514) |
| *InstitutionS* | -0.0354 | -0.0348 | -0.0354 | -0.0353 |
| | (-0.612) | (-0.601) | (-0.612) | (-0.611) |
| *SponsorR* | -0.0716 | -0.0737 | -0.0716 | -0.0718 |
| | (-1.089) | (-1.117) | (-1.089) | (-1.093) |
| *InstitutionR* | -0.0311 | -0.0286 | -0.0311 | -0.0304 |
| | (-0.375) | (-0.345) | (-0.375) | (-0.366) |
| *FundR* | 0.102*** | 0.101*** | 0.102*** | 0.103*** |
| | (5.303) | (5.258) | (5.299) | (5.286) |
| *LnAnalystE* | 0.00528*** | 0.00532*** | 0.00528*** | 0.00528*** |
| | (4.666) | (4.696) | (4.665) | (4.656) |
| *LnFollowCN* | 0.00672*** | 0.00673*** | 0.00672*** | 0.00672*** |
| | (8.921) | (8.938) | (8.921) | (8.919) |
| *Size* | 0.0512*** | 0.0507*** | 0.0513*** | 0.0510*** |
| | (5.258) | (5.192) | (5.251) | (5.198) |
| *PB* | 0.00634** | 0.00567* | 0.00642** | 0.00627** |
| | (2.168) | (1.954) | (2.214) | (2.106) |
| *ChROA* | 0.502*** | 0.556*** | 0.500*** | 0.510*** |
| | (4.796) | (5.289) | (4.737) | (4.807) |
| *Volume* | 0.0413* | 0.0406* | 0.0413* | 0.0414* |
| | (1.937) | (1.918) | (1.934) | (1.941) |
| *InsiderOwn* | 0.442*** | 0.422*** | 0.443*** | 0.441*** |
| | (4.725) | (4.622) | (4.738) | (4.695) |
| *InstOwn* | 0.254*** | 0.253*** | 0.253*** | 0.254*** |
| | (3.489) | (3.496) | (3.475) | (3.502) |
| *Soe* | -0.0696*** | -0.0642*** | -0.0697*** | -0.0698*** |
| | (-4.017) | (-3.958) | (-4.052) | (-4.022) |
| Constant | -1.416*** | -1.407*** | -1.416*** | -1.412*** |
| | (-2.866) | (-2.852) | (-2.867) | (-2.861) |
| Industry, Year | Control | Control | Control | Control |
| Obs. | 39,835 | 39,835 | 39,835 | 39,835 |
| R-squared | 0.127 | 0.127 | 0.127 | 0.127 |

## Table 7 Relationship between the number of reports released by analysts and the accuracy of analysts' earnings forecasts.

This table shows the regression analysis results for hypothesis H2b. OLS regressions are conducted with standard errors clustered by analyst and firm. T statistics modified by heteroscedasticity are reported in parentheses. *, ** and *** represent significance at the 10%, 5% and 1% levels, respectively. All variables are defined in the Appendix.

| VARIABLES | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| **LnReportN** | **-0.164*** ** | **-0.176*** ** | **-0.165*** ** | **-0.167*** ** |
| | **(-2.663)** | **(-2.816)** | **(-2.663)** | **(-2.696)** |
| Invst | | 1.413** | | |
| | | (2.380) | | |
| Invst_LstYear | | 3.085*** | | |
| | | (5.709) | | |
| *R&D* | | | 3.339 | |
| | | | (0.884) | |
| *R&D_LstYear* | | | 2.109 | |
| | | | (1.055) | |
| *M&A* | | | | -0.275*** |
| | | | | (-2.641) |
| *M&A_LstYear* | | | | 0.306*** |
| | | | | (2.927) |
| *Star* | 0.174 | 0.174 | 0.178 | 0.180 |
| | (0.644) | (0.649) | (0.657) | (0.667) |
| *InstitutionS* | -0.285** | -0.274** | -0.285** | -0.285** |
| | (-2.140) | (-2.057) | (-2.140) | (-2.142) |
| *SponsorR* | 2.522 | 2.476 | 2.514 | 2.513 |
| | (1.141) | (1.124) | (1.140) | (1.139) |
| *InstitutionR* | -0.209 | -0.176 | -0.211 | -0.191 |
| | (-0.366) | (-0.308) | (-0.367) | (-0.337) |
| *FundR* | -0.491*** | -0.512*** | -0.490*** | -0.493*** |
| | (-3.652) | (-3.742) | (-3.651) | (-3.651) |
| *LnAnalystE* | 0.0145* | 0.0151* | 0.0146* | 0.0143* |
| | (1.837) | (1.914) | (1.854) | (1.826) |
| *LnFollowCN* | -0.00244 | -0.00209 | -0.00244 | -0.00241 |
| | (-1.030) | (-0.884) | (-1.036) | (-1.019) |
| *Size* | -0.401*** | -0.408*** | -0.404*** | -0.403*** |
| | (-6.480) | (-6.545) | (-6.512) | (-6.540) |
| *PB* | -0.195*** | -0.204*** | -0.199*** | -0.196*** |
| | (-9.429) | (-9.598) | (-9.724) | (-9.519) |
| *ChROA* | -20.00*** | -19.03*** | -19.89*** | -19.79*** |
| | (-7.853) | (-7.607) | (-7.811) | (-7.861) |
| *Volume* | 0.522*** | 0.504*** | 0.524*** | 0.523*** |
| | (6.983) | (6.727) | (6.956) | (6.979) |
| *InsiderOwn* | 0.394 | 0.0136 | 0.351 | 0.379 |
| | (0.808) | (0.0273) | (0.724) | (0.770) |
| *InstOwn* | -1.588*** | -1.613*** | -1.560*** | -1.584*** |
| | (-5.747) | (-5.875) | (-5.760) | (-5.760) |
| *Soe* | 0.187 | 0.290** | 0.198 | 0.178 |
| | (1.502) | (2.354) | (1.610) | (1.454) |
| Constant | 6.292*** | 6.373*** | 6.292*** | 6.364*** |
| | (4.047) | (4.089) | (4.051) | (4.087) |
| Industry、Year | Control | Control | Control | Control |
| Obs. | 32,504 | 32,504 | 32,504 | 32,504 |
| R-squared | 0.020 | 0.021 | 0.020 | 0.020 |

## Table 8 Relationship between overall investment level and analyst recommendations grouped by connections.

This table shows the regression analysis results for hypothesis H3. Ordered logit regressions are conducted with standard errors clustered by analyst. Z statistics modified by heteroscedasticity are reported in parentheses. *, ** and *** represent significance at the 10%, 5% and 1% levels, respectively. All variables are defined in the Appendix.

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| VARIABLES | *SponsorR*=1 | *SponsorR*=0 | *InstitutionR*=1 | *InstitutionR*=0 | *FundR*=1 | *FundR*=0 |
| **Invst** | **2.610** | **0.829*** ** | **0.0466** | **0.840*** ** | **0.523** | **0.855*** ** |
| | **(1.422)** | **(5.659)** | **(0.0113)** | **(6.005)** | **(1.099)** | **(6.130)** |
| **Invst LstYear** | **1.643** | **0.454*** ** | **3.900** | **0.448*** ** | **0.159** | **0.476*** ** |
| | **(0.895)** | **(4.114)** | **(1.281)** | **(4.058)** | **(0.347)** | **(4.225)** |
| *Star* | 0.166 | 0.275** | 0.310 | 0.275** | 0.0549 | 0.289*** |
| | (0.270) | (2.336) | (0.395) | (2.419) | (0.210) | (2.611) |
| *InstitutionS* | 0.0352 | -0.197 | -0.770 | -0.192 | -0.342* | -0.181 |
| | (0.106) | (-1.598) | (-1.367) | (-1.554) | (-1.658) | (-1.494) |
| *SponsorR* | | | 13.25*** | 0.577*** | 0.859 | 0.566*** |
| | | | (10.01) | (4.124) | (1.463) | (4.174) |
| *InstitutionR* | 16.59*** | 0.799*** | | | -0.711 | 0.902*** |
| | (15.99) | (4.193) | | | (-0.944) | (4.598) |
| *FundR* | 0.651 | 0.503*** | -0.652 | 0.507*** | | |
| | (0.932) | (6.626) | (-0.643) | (6.530) | | |
| *LnAnalystE* | -0.227 | -0.0339 | -0.506 | -0.0349 | -0.0554 | -0.0348 |
| | (-1.208) | (-0.840) | (-1.427) | (-0.862) | (-0.642) | (-0.881) |
| *LnFollowCN* | -0.109 | -0.164*** | -0.574* | -0.163*** | -0.114 | -0.166*** |
| | (-0.682) | (-6.864) | (-1.646) | (-6.811) | (-1.616) | (-6.892) |
| *Size* | 0.515** | 0.0350* | -0.182 | 0.0365* | 0.204*** | 0.0314 |
| | (2.440) | (1.648) | (-0.604) | (1.679) | (2.947) | (1.473) |
| *PB* | 0.440*** | 0.0351*** | 0.125 | 0.0367*** | 0.0231 | 0.0398*** |
| | (4.125) | (5.102) | (0.806) | (5.383) | (1.128) | (5.934) |
| *ChROA* | 0.155 | 4.964*** | 12.85 | 4.923*** | 4.320*** | 4.969*** |
| | (0.0310) | (12.13) | (1.589) | (11.85) | (3.011) | (12.04) |
| *Volume* | -0.524 | 0.173*** | -0.0237 | 0.173*** | -0.0571 | 0.177*** |
| | (-1.464) | (6.311) | (-0.0582) | (6.239) | (-0.634) | (6.056) |
| *InsiderOwn* | -2.610* | 0.693*** | -0.664 | 0.665*** | 0.603 | 0.644*** |
| | (-1.666) | (5.496) | (-0.226) | (5.228) | (1.081) | (4.878) |
| *InstOwn* | -1.344 | 0.758*** | 1.216 | 0.745*** | 0.585 | 0.741*** |
| | (-1.245) | (12.78) | (0.845) | (12.45) | (1.561) | (12.05) |
| *Soe* | -0.573 | -0.267*** | -0.489 | -0.267*** | 0.0156 | -0.281*** |
| | (-0.982) | (-10.18) | (-1.095) | (-10.20) | (0.149) | (-10.42) |
| Constant cut1 | 3.468 | -1.407*** | -6.598 | -1.366*** | -2.094 | -1.418*** |
| | (0.601) | (-2.931) | (-0.927) | (-2.865) | (-1.394) | (-2.863) |
| Constant cut2 | 6.771 | -1.033** | -3.297 | -0.991** | -1.841 | -1.036** |
| | (1.182) | (-2.076) | (-0.459) | (-2.004) | (-1.318) | (-2.015) |
| Constant cut3 | | 2.457*** | | 2.501*** | 0.423 | 2.502*** |
| | | (5.458) | | (5.558) | (0.314) | (5.327) |
| Constant cut4 | | 5.366*** | | 5.410*** | 3.669*** | 5.404*** |
| | | (12.09) | | (12.09) | (2.696) | (11.74) |
| Industry, Year | Control | Control | Control | Control | Control | Control |
| Obs. | 274 | 39,561 | 104 | 39,731 | 2,106 | 37,729 |
| Pseudo $R^2$ | 0.2447 | 0.0576 | 0.1479 | 0.0582 | 0.0463 | 0.0550 |

## Table 9 Relationship between R&D level and analyst recommendations grouped by connections.

This table shows the regression analysis results for hypothesis H3. Ordered logit regressions are conducted with standard errors clustered by analyst. Z statistics modified by heteroscedasticity are reported in parentheses. *, ** and *** represent significance at the 10%, 5% and 1% levels, respectively. All variables are defined in the Appendix.

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| VARIABLES | *SponsorR*=1 | *SponsorR*=0 | *InstitutionR*=1 | *InstitutionR*=0 | *FundR*=1 | *FundR*=0 |
| ***R&D*** | **5.149** | **1.690*** ** | **14.65** | **1.666*** ** | **1.264** | **1.772*** ** |
| | **(1.175)** | **(3.602)** | **(0.994)** | **(3.526)** | **(0.530)** | **(3.645)** |
| ***R&D LstYear*** | **0.252** | **1.816*** ** | **8.790** | **1.800*** ** | **-1.843** | **1.979*** ** |
| | (0.0370) | (5.334) | (0.670) | (5.357) | (-0.918) | (5.753) |
| *Star* | 0.220 | 0.276** | -0.338 | 0.276** | 0.0473 | 0.291*** |
| | (0.337) | (2.359) | (-0.315) | (2.447) | (0.179) | (2.650) |
| *InstitutionS* | 0.0429 | -0.200 | -1.182** | -0.195 | -0.343* | -0.184 |
| | (0.131) | (-1.620) | (-2.062) | (-1.577) | (-1.650) | (-1.519) |
| *SponsorR* | | | 17.54*** | 0.584*** | 0.896 | 0.571*** |
| | | | (11.22) | (4.170) | (1.511) | (4.198) |
| *InstitutionR* | 16.77*** | 0.782*** | | | -0.719 | 0.883*** |
| | (16.27) | (4.111) | | | (-0.957) | (4.512) |
| *FundR* | 0.764 | 0.511*** | 0.195 | 0.514*** | | |
| | (1.171) | (6.683) | (0.227) | (6.598) | | |
| *LnAnalystE* | -0.248 | -0.0342 | -0.728** | -0.0352 | -0.0544 | -0.0352 |
| | (-1.276) | (-0.851) | (-1.969) | (-0.872) | (-0.630) | (-0.891) |
| *LnFollowCN* | -0.103 | -0.165*** | -0.575 | -0.164*** | -0.115 | -0.167*** |
| | (-0.659) | (-6.885) | (-1.175) | (-6.834) | (-1.619) | (-6.907) |
| *Size* | 0.472** | 0.0342 | -0.0497 | 0.0356 | 0.203*** | 0.0307 |
| | (2.300) | (1.587) | (-0.115) | (1.614) | (2.904) | (1.426) |
| *PB* | 0.421*** | 0.0361*** | -0.0353 | 0.0377*** | 0.0246 | 0.0406*** |
| | (3.649) | (5.267) | (-0.274) | (5.547) | (1.196) | (6.090) |
| *ChROA* | -1.736 | 4.734*** | 11.23 | 4.688*** | 4.015*** | 4.734*** |
| | (-0.373) | (11.24) | (1.219) | (10.99) | (2.770) | (11.11) |
| *Volume* | -0.448 | 0.179*** | 0.0203 | 0.179*** | -0.0615 | 0.184*** |
| | (-1.316) | (6.478) | (0.0467) | (6.405) | (-0.678) | (6.271) |
| *InsiderOwn* | -2.630* | 0.780*** | 2.887 | 0.751*** | 0.619 | 0.731*** |
| | (-1.690) | (6.115) | (1.189) | (5.844) | (1.091) | (5.504) |
| *InstOwn* | -1.257 | 0.783*** | 4.637*** | 0.771*** | 0.555 | 0.768*** |
| | (-1.174) | (13.14) | (3.014) | (12.80) | (1.460) | (12.42) |
| *Soe* | -0.656 | -0.289*** | -0.877 | -0.289*** | 0.00384 | -0.304*** |
| | (-1.174) | (-11.04) | (-1.568) | (-11.07) | (0.0356) | (-11.28) |
| Constant cut1 | 2.733 | -1.401*** | -21.64** | -1.362*** | -2.335 | -1.397*** |
| | (0.470) | (-2.915) | (-2.463) | (-2.857) | (-1.520) | (-2.813) |
| Constant cut2 | 6.001 | -1.027** | -17.33** | -0.988** | -2.083 | -1.015** |
| | (1.039) | (-2.060) | (-1.972) | (-1.995) | (-1.456) | (-1.970) |
| Constant cut3 | | 2.462*** | | 2.503*** | 0.182 | 2.521*** |
| | | (5.457) | | (5.552) | (0.132) | (5.344) |
| Constant cut4 | | 5.368*** | | 5.409*** | 3.428** | 5.420*** |
| | | (12.07) | | (12.07) | (2.451) | (11.73) |
| Industry, Year | Control | Control | Control | Control | Control | Control |
| Obs. | 274 | 39,561 | 104 | 39,731 | 2,106 | 37,729 |
| $R^2$ | 0.2364 | 0.0569 | 0.3429 | 0.0574 | 0.0462 | 0.0542 |

## Table 10 Relationship between M&A behavior and analyst recommendations grouped by connections.

This table shows the regression analysis results for hypothesis H3. Ordered logit regressions are conducted with standard errors clustered by analyst. Z statistics modified by heteroscedasticity are reported in parentheses. *, ** and *** represent significance at the 10%, 5% and 1% levels, respectively. All variables are defined in the Appendix.

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| VARIABLES | *SponsorR*=1 | *SponsorR*=0 | *InstitutionR*=1 | *InstitutionR*=0 | *FundR*=1 | *FundR*=0 |
| ***M&A*** | **0.326** | **0.0915*** ** | **1.282** | **0.0910*** ** | **-0.00129** | **0.0962*** ** |
| | **(1.000)** | **(4.512)** | **(1.585)** | **(4.361)** | **(-0.0153)** | **(4.529)** |
| ***M&A_LstYear*** | **-0.201** | **0.0811*** ** | **-0.693** | **0.0789*** ** | **0.0271** | **0.0833*** ** |
| | **(-0.515)** | **(3.921)** | **(-0.760)** | **(3.739)** | **(0.308)** | **(3.874)** |
| *Star* | 0.257 | 0.274** | -0.527 | 0.275** | 0.0558 | 0.289*** |
| | (0.389) | (2.345) | (-0.466) | (2.431) | (0.214) | (2.626) |
| *InstitutionS* | 0.159 | -0.201 | -1.707** | -0.196 | -0.342* | -0.186 |
| | (0.496) | (-1.639) | (-1.998) | (-1.594) | (-1.660) | (-1.536) |
| *SponsorR* | | | 18.60*** | 0.595*** | 0.887 | 0.583*** |
| | | | (11.02) | (4.265) | (1.508) | (4.306) |
| *InstitutionR* | 16.39*** | 0.779*** | | | -0.708 | 0.878*** |
| | (16.58) | (4.108) | | | (-0.944) | (4.490) |
| *FundR* | 0.723 | 0.513*** | 0.821 | 0.516*** | | |
| | (1.079) | (6.780) | (0.851) | (6.689) | | |
| *LnAnalystE* | -0.233 | -0.0340 | -0.750** | -0.0349 | -0.0548 | -0.0350 |
| | (-1.223) | (-0.842) | (-2.061) | (-0.862) | (-0.636) | (-0.881) |
| *LnFollowCN* | -0.0965 | -0.166*** | -0.555 | -0.165*** | -0.117* | -0.168*** |
| | (-0.609) | (-6.925) | (-1.138) | (-6.873) | (-1.655) | (-6.952) |
| *Size* | 0.434** | 0.0337 | -0.00860 | 0.0350 | 0.201*** | 0.0299 |
| | (2.013) | (1.574) | (-0.0200) | (1.600) | (2.895) | (1.395) |
| *PB* | 0.433*** | 0.0366*** | -0.0736 | 0.0382*** | 0.0245 | 0.0412*** |
| | (3.751) | (5.324) | (-0.505) | (5.613) | (1.188) | (6.117) |
| *ChROA* | -2.602 | 4.635*** | 11.82 | 4.589*** | 4.075*** | 4.633*** |
| | (-0.557) | (10.94) | (1.505) | (10.69) | (2.815) | (10.83) |
| *Volume* | -0.379 | 0.178*** | -0.328 | 0.178*** | -0.0562 | 0.183*** |
| | (-1.034) | (6.487) | (-0.829) | (6.417) | (-0.617) | (6.258) |
| *InsiderOwn* | -2.585 | 0.781*** | 3.694 | 0.751*** | 0.651 | 0.733*** |
| | (-1.632) | (6.113) | (1.185) | (5.841) | (1.152) | (5.534) |
| *InstOwn* | -1.210 | 0.770*** | 4.618*** | 0.758*** | 0.570 | 0.756*** |
| | (-1.140) | (12.94) | (2.731) | (12.60) | (1.512) | (12.20) |
| *Soe* | -0.621 | -0.284*** | -0.729 | -0.284*** | 0.00359 | -0.299*** |
| | (-1.108) | (-10.66) | (-1.504) | (-10.67) | (0.0331) | (-10.86) |
| Constant | 3.786 | -1.406*** | -29.00*** | -1.367*** | -2.228 | -1.416*** |
| | (0.620) | (-2.928) | (-3.347) | (-2.872) | (-1.455) | (-2.857) |
| Constant | 7.066 | -1.032** | -24.62*** | -0.993** | -1.975 | -1.034** |
| | (1.165) | (-2.075) | (-2.899) | (-2.011) | (-1.392) | (-2.012) |
| Constant | | 2.457*** | | 2.498*** | 0.289 | 2.502*** |
| | | (5.452) | | (5.553) | (0.210) | (5.319) |
| Constant | | 5.362*** | | 5.403*** | 3.534** | 5.401*** |
| | | (12.07) | | (12.09) | (2.542) | (11.73) |
| Industry,Year | Control | Control | Control | Control | Control | Control |
| Obs. | 274 | 37,418 | 104 | 37,588 | 2,106 | 35,586 |
| $R^2$ | 0.2372 | 0.0568 | 0.3572 | 0.0573 | 0.0459 | 0.0541 |

## Table 11 Relationship between corporate investment behavior and analysts coverage

This table shows the regression analysis results for the relationship between corporate investment behavior and analyst coverage. OLS regressions are conducted with standard errors clustered by firm. T statistics modified by heteroscedasticity are reported in parentheses. *, ** and *** represent significance at the 10%, 5% and 1% levels, respectively. All variables are defined in the Appendix.

| VARIABLES | (1) | (2) | (3) |
|---|---|---|---|
| **Invst** | **0.523*** ** | | |
| | **(6.652)** | | |
| **Invst LstYeat** | **0.515*** ** | | |
| | **(5.964)** | | |
| ***R&D*** | | **1.070*** ** | |
| | | **(3.242)** | |
| ***R&D LstYear*** | | **0.497** | |
| | | **(1.523)** | |
| ***M&A*** | | | **0.0341** ** |
| | | | **(2.158)** |
| ***M&A LstYear*** | | | **0.0397** ** |
| | | | **(2.468)** |
| Size | 0.167*** | 0.167*** | 0.171*** |
| | (16.41) | (15.14) | (16.78) |
| PB | 0.0384*** | 0.0436*** | 0.0388*** |
| | (9.115) | (8.709) | (9.097) |
| Return | -0.122*** | -0.0997*** | -0.118*** |
| | (-8.033) | (-5.480) | (-7.773) |
| Volume | 0.250*** | 0.251*** | 0.253*** |
| | (18.55) | (17.25) | (18.69) |
| InsiderOwn | 1.406*** | 1.365*** | 1.516*** |
| | (17.09) | (15.64) | (18.65) |
| InstOwn | 1.114*** | 1.067*** | 1.121*** |
| | (27.13) | (24.13) | (27.26) |
| SOE | -0.161*** | -0.189*** | -0.179*** |
| | (-8.714) | (-9.612) | (-9.747) |
| Constant | -7.075*** | -6.932*** | -7.168*** |
| | (-33.79) | (-30.08) | (-33.96) |
| Year, Industry | Yes | Yes | Yes |
| Obs. | 7,329 | 7329 | 7,329 |
| R-squared | 0.339 | 0.310 | 0.334 |

## Table 12 Relationship between corporate investment behavior and the private information of analysts at the firm level.

This table shows the regression analysis results for the relationship between corporate investment behavior and the private information of analysts at the firm level. OLS regressions are conducted with standard errors clustered by firm. T statistics modified by heteroscedasticity are reported in parentheses. *, ** and *** represent significance at the 10%, 5% and 1% levels, respectively. All variables are defined in the Appendix.

| VARIABLES | (1) | (2) | (3) |
|---|---|---|---|
| **Invst** | **0.178*** ** | | |
| | **(3.632)** | | |
| **Invst_LstYeat** | **-0.0655** | | |
| | **(-1.344)** | | |
| ***R&D*** | | **0.697*** ** | |
| | | **(3.694)** | |
| ***R&D_LstYear*** | | **0.0986** | |
| | | **(0.594)** | |
| ***M&A*** | | | **0.0253*** ** |
| | | | **(2.700)** |
| ***M&A_LstYear*** | | | **0.00527** |
| | | | **(0.558)** |
| Size | 0.00362 | 0.00649 | 0.00339 |
| | (0.791) | (1.367) | (0.741) |
| PB | 0.00490** | 0.00588*** | 0.00513** |
| | (2.358) | (2.620) | (2.465) |
| ABSChROA | -1.300*** | -1.532*** | -1.280*** |
| | (-8.019) | (-9.158) | (-7.927) |
| InsiderOwn | 0.140*** | 0.135*** | 0.145*** |
| | (2.905) | (2.741) | (3.002) |
| InstOwn | 0.0862*** | 0.107*** | 0.0887*** |
| | (3.751) | (4.490) | (3.855) |
| SOE | -0.0119 | -0.0112 | -0.0124 |
| | (-1.067) | (-0.983) | (-1.112) |
| Constant | 0.458*** | 0.382*** | 0.455*** |
| | (4.158) | (3.097) | (4.133) |
| Year, Industry | Yes | Yes | Yes |
| Obs. | 7,329 | 7329 | 7,329 |
| R-squared | 0.027 | 0.033 | 0.028 |

## Table 13 Analysts' optimism about corporate investment behavior and the overvaluation of stock prices

This table shows the regression analysis results for analysts' optimism about corporate investment behavior and the overvaluation of stock prices. OLS regressions are conducted with standard errors clustered by firm. T statistics modified by heteroscedasticity are reported in parentheses. *, ** and *** represent significance at the 10%, 5% and 1% levels, respectively. All variables are defined in the Appendix.

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| **AverageRank** | **0.176*** ** | **0.154*** ** | **0.164*** ** | **0.161*** ** | **0.177*** ** | **0.147*** ** |
| | **(11.15)** | **(8.847)** | **(10.45)** | **(9.840)** | **(11.24)** | **(8.015)** |
| **Invst** | **0.544*** ** | **-1.157*** | | | | |
| | **(8.689)** | **(-1.913)** | | | | |
| **Invst_LstYeat** | **-0.330*** ** | **-0.312*** ** | | | | |
| | **(-4.985)** | **(-4.686)** | | | | |
| **Invst*AverageRank** | | **0.401*** ** | | | | |
| | | **(2.826)** | | | | |
| ***R&D*** | | | **1.064*** ** | **-0.555** | | |
| | | | **(4.376)** | **(-0.240)** | | |
| ***R&D_LstYear*** | | | **-0.313** | **-0.317** | | |
| | | | **(-1.393)** | **(-1.407)** | | |
| ***R&D*AverageRank*** | | | | **0.387** | | |
| | | | | **(0.705)** | | |
| **M&A** | | | | | **0.0657*** ** | **-0.342*** ** |
| | | | | | **(5.245)** | **(-2.771)** |
| **M&A_LstYear** | | | | | **0.0138** | **0.0132** |
| | | | | | **(1.084)** | **(1.041)** |
| **M&A*AverageRank** | | | | | | **0.0974*** ** |
| | | | | | | **(3.320)** |
| ChROA | 3.156*** | 3.149*** | 2.780*** | 2.781*** | 3.111*** | 3.124*** |
| | (18.31) | (18.28) | (16.19) | (16.19) | (18.05) | (18.13) |
| Size | -0.0747** | -0.0748** | -0.0721** | -0.0722** | -0.0763** | -0.0760** |
| | (-14.41) | (-14.45) | (-14.35) | (-14.35) | (-14.69) | (-14.64) |
| Constant | 2.724*** | 2.815*** | 2.670*** | 2.684*** | 2.734*** | 2.854*** |
| | (20.10) | (20.21) | (18.94) | (18.85) | (20.09) | (20.28) |
| Year, Industry | Yes | Yes | Yes | Yes | Yes | Yes |
| Obs. | 7329 | 7329 | 7329 | 7329 | 7329 | 7329 |
| R-squared | 0.612 | 0.612 | 0.565 | 0.565 | 0.609 | 0.610 |

## Table 14 Relationship between analyst recommendations and the relative number of reports released by analysts

This table shows the regression analysis results for robustness tests of hypothesis H2a. OLS regressions are conducted with standard errors clustered by analyst and firm. T statistics modified by heteroscedasticity are reported in parentheses. *, ** and *** represent significance at the 10%, 5% and 1% levels, respectively. All variables are defined in the Appendix.

| VARIABLES | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| **rank** | **0.678*** ** | **0.676*** ** | **0.679*** ** | **0.678*** ** |
| | **(4.246)** | **(4.243)** | **(4.236)** | **(4.164)** |
| Invst | | 0.0349 | | |
| | | (0.0730) | | |
| Invst LstYear | | 0.264 | | |
| | | (0.552) | | |
| *R&D* | | | -0.983 | |
| | | | (-0.584) | |
| *R&D LstYear* | | | -0.499 | |
| | | | (-0.467) | |
| *M&A* | | | | -0.0589 |
| | | | | (-0.442) |
| *M&A LstYear* | | | | 0.0171 |
| | | | | (0.177) |
| *Star* | 0.887** | 0.887** | 0.886** | 0.888** |
| | (2.529) | (2.531) | (2.528) | (2.530) |
| *InstitutionS* | -0.792 | -0.791 | -0.792 | -0.792 |
| | (-1.092) | (-1.091) | (-1.092) | (-1.092) |
| *SponsorR* | -1.157 | -1.159 | -1.155 | -1.158 |
| | (-1.348) | (-1.347) | (-1.346) | (-1.345) |
| *InstitutionR* | -0.790 | -0.789 | -0.791 | -0.788 |
| | (-1.023) | (-1.017) | (-1.024) | (-1.020) |
| *FundR* | 0.218 | 0.217 | 0.218 | 0.217 |
| | (0.706) | (0.709) | (0.706) | (0.705) |
| *LnAnalystE* | 0.0515*** | 0.0515*** | 0.0514*** | 0.0514*** |
| | (3.385) | (3.385) | (3.381) | (3.390) |
| *LnFollowCN* | 0.0688*** | 0.0688*** | 0.0688*** | 0.0688*** |
| | (9.168) | (9.198) | (9.162) | (9.168) |
| *Size* | 0.169 | 0.168 | 0.170 | 0.170 |
| | (0.951) | (0.947) | (0.954) | (0.937) |
| *PB* | 0.0309 | 0.0304 | 0.0321 | 0.0314 |
| | (0.518) | (0.512) | (0.531) | (0.508) |
| *ChROA* | 1.317 | 1.379 | 1.281 | 1.347 |
| | (0.671) | (0.683) | (0.657) | (0.676) |
| *Volume* | 0.226 | 0.225 | 0.225 | 0.225 |
| | (0.585) | (0.584) | (0.583) | (0.586) |
| *InsiderOwn* | 1.437 | 1.411 | 1.449 | 1.441 |
| | (1.002) | (1.002) | (1.005) | (0.991) |
| *InstOwn* | 0.609 | 0.608 | 0.600 | 0.607 |
| | (0.537) | (0.537) | (0.530) | (0.539) |
| *Soe* | -0.0682 | -0.0613 | -0.0714 | -0.0730 |
| | (-0.286) | (-0.271) | (-0.300) | (-0.296) |
| Constant | -12.01 | -11.99 | -12.02 | -12.00 |
| | (-1.037) | (-1.037) | (-1.037) | (-1.035) |
| Industry, Year | Control | Control | Control | Control |
| Obs. | 39,835 | 39,835 | 39,835 | 39,835 |
| R-squared | 0.030 | 0.030 | 0.030 | 0.030 |

## Table 15 Relationship between the relative number of reports released by analysts and the accuracy of analysts' earnings forecasts.

This table shows the regression analysis results for robustness tests of hypothesis H2b. OLS regressions are conducted with standard errors clustered by analyst and firm. T statistics modified by heteroscedasticity are reported in parentheses. *, ** and *** represent significance at the 10%, 5% and 1% levels.

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| **RelativeReportNum** | **-0.00853**** | **-0.00872**** | **-0.00851**** | **-0.00864**** |
| | **(-2.273)** | **(-2.257)** | **(-2.271)** | **(-2.296)** |
| Invst | | 1.393** | | |
| | | (2.347) | | |
| Invst LstYeat | | 3.067*** | | |
| | | (5.669) | | |
| *R&D* | | | 3.332 | |
| | | | (0.882) | |
| *R&D LstYear* | | | 2.099 | |
| | | | (1.049) | |
| *M&A* | | | | -0.274*** |
| | | | | (-2.634) |
| *M&A LstYear* | | | | 0.303*** |
| | | | | (2.905) |
| *Star* | 0.155 | 0.154 | 0.158 | 0.160 |
| | (0.573) | (0.572) | (0.587) | (0.595) |
| *InstitutionS* | -0.285** | -0.274** | -0.285** | -0.285** |
| | (-2.127) | (-2.043) | (-2.127) | (-2.129) |
| *SponsorR* | 2.522 | 2.477 | 2.515 | 2.514 |
| | (1.142) | (1.125) | (1.141) | (1.140) |
| *InstitutionR* | -0.215 | -0.182 | -0.216 | -0.197 |
| | (-0.375) | (-0.318) | (-0.377) | (-0.347) |
| *FundR* | -0.506*** | -0.528*** | -0.505*** | -0.508*** |
| | (-3.788) | (-3.883) | (-3.787) | (-3.790) |
| *LnAnalystE* | 0.0141* | 0.0147* | 0.0143* | 0.0140* |
| | (1.798) | (1.870) | (1.815) | (1.786) |
| *LnFollowCN* | -0.00289 | -0.00260 | -0.00290 | -0.00287 |
| | (-1.217) | (-1.096) | (-1.226) | (-1.210) |
| *Size* | -0.407*** | -0.414*** | -0.411*** | -0.410*** |
| | (-6.591) | (-6.663) | (-6.622) | (-6.647) |
| *PB* | -0.196*** | -0.205*** | -0.200*** | -0.197*** |
| | (-9.469) | (-9.637) | (-9.765) | (-9.555) |
| *ChROA* | -20.09*** | -19.13*** | -19.98*** | -19.88*** |
| | (-7.896) | (-7.659) | (-7.855) | (-7.906) |
| *Volume* | 0.515*** | 0.496*** | 0.517*** | 0.516*** |
| | (6.920) | (6.660) | (6.894) | (6.916) |
| *InsiderOwn* | 0.333 | -0.0491 | 0.290 | 0.317 |
| | (0.675) | (-0.0974) | (0.591) | (0.637) |
| *InstOwn* | -1.630*** | -1.658*** | -1.602*** | -1.627*** |
| | (-5.869) | (-6.011) | (-5.886) | (-5.885) |
| *Soe* | 0.199 | 0.302** | 0.211* | 0.190 |
| | (1.638) | (2.511) | (1.749) | (1.591) |
| Constant | 6.372*** | 6.461*** | 6.372*** | 6.445*** |
| | (4.089) | (4.141) | (4.094) | (4.129) |
| Industry, Year | Control | Control | Control | Control |
| Obs. | 32,504 | 32,504 | 32,504 | 32,504 |
| R-squared | 0.020 | 0.021 | 0.020 | 0.020 |