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Earnings management and analyst forecast

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ABSTRACT

This study explores the relationship between surplus management, analysts' attention, and earnings forecasts, which we empirically analyze by selecting selected A-share listed companies in China from 2015 to 2022 as a research sample. Our findings indicate that the higher the degree of the company's surplus management, the lower the degree of analysts' attention. Furthermore, the higher the degree of the company's earnings management, the lower the degree of analysts' over-attention. Moreover, the higher the branch's earnings management degree, the lower the analysts' earnings forecasting accuracy. Finally, substantial differences exist in the relationship between earnings management and analysts' forecasts, such as business property rights.

1. Introduction

The regulatory system, mandatory information disclosure, and external auditing in modern capital markets are designed to enhance corporate disclosure accuracy, timeliness, and comprehensiveness (Beardsley et al., 2021). However, information disclosure by listed companies may not help investors. Excessive disclosure and a large amount of information of mixed quality may overwhelm investors with an overabundance of data. Securities analysts help collect, organize, and interpret information, which can alleviate the problem of information asymmetry between listed companies and shareholders. This function of information intermediary also gives securities analysts a specific supervisory function (Lin et al., 2020). According to Le and Trinh (2022), securities analysts are the representatives of the investors and a professional supervisory force.

Conversely, the professionalism and independence of securities analysts are also challenged by a certain degree of reality because the analysts' purpose of tracking the subject company and making earnings forecasts is perhaps more complex. For example, the analyst's financial institution may sponsor and underwrite the subject company, hold some investment shares, or have other complex relationships with the company's management (Kałdoński and Jewartowski, 2020). Thus, when these realities challenge the professionalism and independence of securities analysts, their tracking of targets and earnings forecast results are likely to be more biased (Devos et al., 2021).

Nonetheless, it is widely recognized in the capital market that securities analysts till date possess professionalism and independence, with the reputation mechanism under game theory playing an important role (Li and Liu, 2022). Analysts are incentivized to earn higher profits for their financial institutions by embellishing their earnings forecasts. Whether such profits come from sponsoring and underwriting the issuance of stocks or bonds or from investor trading commissions, they are ultimately short-lived (Han et al.,

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2022). Overly optimistic profit forecasts will be eliminated when the company announces its performance realization, and the underlying company's share price is at greater risk of decline, seriously damaging the long-term reputation of securities analysts. Under the trade-off between short-term profits and long-term reputation, securities analysts usually cherish their long-term reputation and demand professionalism and independence (Harris et al., 2019).

This study selects China's A-share listed companies from 2015 to 2022 as a research sample to explore the relationships between earnings management, analysts' attention, and earnings forecasts. Our findings indicate that the higher the degree of the company's earnings management, the lower the analysts' attention. Furthermore, the higher the degree of the company's earnings management, the lower the degree of analysts' over-attention. In addition, the higher the branch's earnings management degree, the lower the accuracy of analysts' earnings forecasts. Finally, substantial differences exist in the relationship between earnings management and analysts' forecasts, such as enterprise property rights.

We focus on past research on earnings management and analysts' attention. How an company's level of earnings management is affected in the current year has been studied in depth; however, the possible existence of the inverse relationship between the two has received less attention. Therefore, this study explores the inter-period relationship between earnings management and analysts' attention. We aim to fill some research gaps in the relationship between earnings management and analysts' attention and emphasize the impact of listed companies' earnings management for the current year on the level of analysts' attention they receive in the following year.

2. Theoretical analysis and research hypotheses

The extant literature on the impact of surplus management on analysts' followings has been divided owing to the differing views on the role played by analysts in the financial market and their role (Hao and Xionget, 2021). Some scholars believe that analyst tracking is similar to an intermediary providing information. Suppose a company's disclosure quality is low. In that case, analysts, in their professional judgment, are more inclined to pay attention to other companies with high disclosure quality; therefore, when a company's surplus management increases, the degree of analyst attention decreases (Pappas et al., 2019). A degree of competition exists between analysts and subject firms in providing high-quality information. Analysts focus their limited attention on subject firms with higher surplus management (Eiler et al., 2021). This study argues that analysts are integrated information intermediaries of public market letters and other available information (Wen et al., 2023).

On the one hand, public market information disclosed by the subject company is essential for analysts to obtain information. Analysts rely more on public market information when making earnings forecasts and are influenced by the earnings forecasts released by the management. Companies with more accurate quantitative earnings forecasts and forecast ranges usually attract more analysts' attention and have lower prediction errors and divergences (Kim et al., 2021). On the other hand, analysts can obtain more non-public information by participating in company visits, research, and forums; however, they are still outsiders. The primary way for outsiders to obtain information is by relying on public information released by company insiders; therefore, it is difficult for analysts as outsiders of the company to compete with the subject company in terms of disclosure of information (Veganzones et al., 2023).

Based on the above, this study proposes the following hypothesis:

H1. The higher the firm's degree of earnings management, the lower the analyst's attention.

The degree of analyst attention is a complex variable affected by factors such as the company's total market capitalization, return on total assets, growth, external financing, and cash flow volatility. In contrast, excess analyst attention refers to the portion that the above-known factors cannot explain (Chan et al., 2019). Excess analyst attention is still a part of analyst attention, and similar to analyst attention, this study argues that excess analyst attention also shows a substantial negative correlation with the level of corporate earnings management.

Based on this, we propose the following hypothesis:

H2. The higher the level of company earnings management, the lower the analysts' excess attention level.

Earnings management (i.e., how company management adjusts the company's operating conditions and financial statements) disguises the company's actual operating conditions and financial conditions to the outside world, intensifies the degree of information asymmetry between the inside and outside of the listed company, and creates a more severe information occlusion (Espahbodi et al., 2020). Analysts are one of the leading external players of listed companies; thus, information that the company has publicly disclosed will likely influence earnings forecasts. Therefore, the earnings management of listed companies will likely decrease the accuracy of analysts' earnings forecasts (El Diri et al., 2020). The conclusions of past studies on the effect of earnings management on analysts' forecast accuracy are relatively uniform. The higher the subject company's level of earnings management, the lower the quality of the available public market information; thus, the quality characteristics of accounting information, such as comparability, reliability, and truthfulness, will be considerably reduced. Simultaneously, analysts have limited ability to detect the signs of earnings management and adjust the earnings forecasts from this information. The credibility of earnings forecasts based on this information decreases, and earnings forecasts must be more accurate (Baker et al., 2021).

Based on this, this study proposes the following hypothesis:

H3. The higher the degree of corporate earnings management, the better the analyst earnings forecast accuracy.

3. Study design

3.1. Sample selection

This study selects data from China's A-share listed companies from 2015 to 2022 as the research sample. The samples are treated as follows. 1) We retain samples related to financial and real estate categories 2) and samples of ST companies. 3) We eliminate samples with missing data. Finally, 21,986 valid observations are obtained. The data are mainly from the Wind and China Stock Market and Accounting Research databases.

3.2. Definition of variables

3.2.1. Dependent variable

Analyst Forecasts (*Anan*): This study uses analyst attention (*Atten*), excess attention (*Catten*), and accuracy of earnings forecasts (*Accur*) as measures. These variables can comprehensively assess the external governance environment and disclosure quality of firms and reveal the information asymmetry between firms and external investors.

Among them, analysts' attention (*Atten*) is measured by the company's earnings forecasting organizations in the current year.

Excess Attention (*Catten*) is measured using the residuals of the following model:

$$Atten_{i,t} = \alpha_0 + \alpha_1 Firmsize_{i,t} + Formamce_{i,t} + Growth_{i,t} + EFA_{i,t} + Cashflowvolatility_{i,t} + Year_{i,t} + \varepsilon_{i,t}. \quad (1)$$

Here, $Atten_{i,t}$ is the number of firm's earnings forecasters in the current year, and $Firmsize_{i,t}$ is the firm's total market capitalization at the end of the previous year. $Formamce_{i,t}$ is the firm's return on total assets in the previous year, $Growth_{i,t}$is the year-on-year rate of change in the firm's total assets, and $EFA_{i,t}$ is the firm's net cash flow from financing activities in the current year divided by the total assets at the end of the previous year. $Cashflowvolatility_{i,t}$is the standard deviation of the firm's net cash flow over the sample period divided by the total assets at the end of the previous year, and $Year_{i,t}$ is the annual dummy variable.

Earnings forecast accuracy (*Accur*): the difference between the forecast FEPS and the actual value of EPS of analyst j, who tracks listed company i in period t, is used to find the absolute value lag and then divided by the actual value of EPS of the listed company i in period t.

3.2.2. Independent variables

Earnings management (*DA*): This study uses accrued earnings management for measurement. We use the modified Jones model, and the cross-section modified Jones model is as follows:

$$NDA_t = \alpha_1 1/A_{t-1} + \frac{\alpha_2 \Delta S_t - \Delta R_t}{A_{t-1}} + \alpha_3 (PPE/A_{t-1}) \quad (2)$$

$$TA_t/A_{t-1} = \alpha_1 1/A_{t-1} + \frac{\alpha_2 \Delta S_t - \Delta R_t}{A_{t-1}} + \alpha_3 PPE/A_{t-1} + \varepsilon_t \quad (3)$$

$$DA_t = TA_t/A_{t-1} - NDA_t \quad (4)$$

Table 1
Variable definition table.

Variable type	Variable name	Variable symbol	Definition
Dependent variable	Analyst Focus	Atten	Measured using the number of firms' profit forecasting organizations for the year
	Overweight concern	Catten	Measured using residuals from model (1)
	Accuracy of earnings forecasts	Accur	Difference between analysts' EPS forecast FEPS and EPS actuals EPS
Independent variable	Earnings management	DA	Measured using the modified Jones model
Control variable	Corporate gearing	Lev	Total liabilities at year-end/total assets at year-end
	Enterprise size	Size	Natural logarithm of total company assets
	Enterprise growth capacity	Growth	Company revenue growth rate
	Institutional shareholding	Ins	Company year-end fund holdings
	Profitability	Roe	Net profit/owners' equity
	Profit forecast	Forecast	If the profit forecasting organization forecasts earnings per share of the company, then it takes the value of 1; otherwise, it takes the value of 0.
	Net profit margin on total assets	Roa	Net profit after tax/total assets at the end of the period
	Share price index component	Index	If the company is a constituent of the CSI 300 Index, the value is 1, otherwise it is 0.

Here, total accrued profit is the difference between net profit and net operating cash flow for the year, which can be categorized into non-manipulative accrued profit (NDA) and manipulative accrued profit (DA). A_{t-1} is the total assets at the beginning of the company's year t, and *PPE* is the original value of the company's fixed assets at the end of year t. ΔS_t is the change in the company's operating income in year t, and ΔR_t is the change of the company's accounts receivable in year t. The second equation is estimated by year and by industry. The values of the estimated model parameters α1, α2, and α3 are brought into the first equation to calculate the non-manipulated accrued profit and, finally, the manipulated accrued profit. Since this study only examines the data in the year before and after substantial asset injections, considering DA's positive and negative offsetting effects, we disregard the directionality of earnings management and measure DA in absolute terms.

3.2.3. Control variables

This study controls for the following variables: firm gearing (*Lev*), firm size (*Size*), firm growth (*Growth*), institutional ownership (*Ins*), profitability (*Roe*), earnings forecast (*Forecast*), return on total assets (*Roa*), and stock index components (*Index*). Furthermore, dummy variables for industry (*Ind*) and year (*Year*) are also included.

See Table 1 for the definitions of specific variables.

3.3. Model construction

The baseline model constructed in this study is as follows:

$$Anan_{i,t} = \beta_0 + \beta_1 DA_{i,t} + \beta Control_{i,t} + \sum Ind + \sum Year + \varepsilon_{i,t}. \quad (5)$$

4. Empirical analysis

4.1. Descriptive statistical analysis

Table 2 presents the descriptive statistical analysis. The mean value of *Atten* is 3.327, and the variance is 5.598, with a minimum value of 0 and a maximum value of 51. These results indicate a substantial difference in the number of forecasts the profit organizations make for the various listed companies. The mean value of *Catten* is 0.008, indicating that the number of over-concerns is low in the various listed companies. The minimum value of *Accur* is 0.059, and the maximum value of Accur is 39.886, indicating a substantial difference in the accuracy of earnings across analysts. The minimum value of *DA* is 0.001, and the maximum is 0.532, indicating a substantial difference in the use of accrued earnings management among the sample firms.

4.2. Main test regression results

Table 3 verifies the relationship between earnings management and analysts' forecasts. In column (1), *DA* is considerably and negatively related to *Atten* at the 1 % level, indicating that the higher the firm's earnings management, the lower the level of analysts' attention; thus, Hypothesis H1 is confirmed. In column (2), *DA* is considerably and negatively correlated with *Catten* at the 1 % level, indicating that the higher the degree of corporate earnings management, the lower the analysts' over-concern; thus, Hypothesis H2 is confirmed. In column (3), *DA* is considerably and positively correlated with *Accur* at the 1 % level, indicating that the higher the degree of company earnings management, the better the accuracy of analysts' earnings forecasts; thus, Hypothesis H3 is confirmed.

4.3. Endogeneity

Mutual causality exists between earnings management and analysts' earnings forecasts; therefore, this study uses 2SLS for further testing. This study examines whether the Big 4 accounting firms (Deloitte, PricewaterhouseCoopers, Ernst & Young, and KPMG) issue the audit report (*Audit*) as an instrumental variable for earnings management to conduct endogeneity tests. Big 4 accounting firms

Table 2
Descriptive statistical analysis.

	N	Mean	Std	Min	Max
Atten	21,986	3.327	5.598	0	51
Catten	21,986	0.008	5.586	−4.495	24.369
Accur	21,986	2.446	4.978	0.059	39.886
DA	21,986	0.065	0.107	0.001	0.532
Lev	21,986	0.453	0.226	0.067	0.895
Size	21,986	20.336	1.275	18.763	26.795
Growth	21,986	0.345	1.397	−0.768	9.775
Ins	21,986	*2.363*	*4.556*	*0*	*0.315*
Roe	21,986	*0.075*	*0.136*	*−0.682*	*0.429*
Forecast	21,986	0.426	0.516	0	1
Roa	21,986	0.064	0.047	−0.158	0.229
Index	21,986	0.053	0.226	0	1

Table 3
Results of the main regression test.

	(1) Atten	(2) Catten	(3) Accur
DA	−1.926***	−1.675***	8.437***
	(−7.73)	(−9.05)	(15.73)
Lev	−0.774***	−0.693***	−0.697***
	(−5.16)	(−6.54)	(−3.29)
Size	0.618***	0.447***	0.593***
	(5.57)	(6.95)	(5.63)
Growth	1.773***	1.595***	1.804***
	(7.75)	(6.04)	(7.27)
Ins	0.463***	0.315***	0.057***
	(18.04)	(21.63)	(11.27)
Roe	0.117	0.286	0.184*
	(1.25)	(0.64)	(1.75)
Forecast	4.293***	3.095***	−2.276***
	(49.57)	(55.89)	(−15.37)
Roa	0.059***	−0.037***	0.025***
	(16.07)	(−15.43)	(11.75)
Index	1.283***	1.916***	−0.837***
	(3.97)	(5.58)	(−4.43)
Cons	−3.237***	−5.493***	4.372***
	(−10.84)	(−11.95)	(7.75)
Ind	Yes	Yes	Yes
Year	Yes	Yes	Yes
N	21,986	21,986	21,986
Adj.R^2	0.479	0.445	0.483

t statistics are in parentheses.
* = $p < 0.10$, ** = $p < 0.05$, and.
*** = $p < 0.01$.

include the most well-known accounting firms in the world and issue annual audit reports with higher authenticity and reliability; therefore, they have a higher correlation with the level of earnings management but a lower correlation with analysts' concerns. Table 4 presents the specific results consistent with the analysis above, indicating that this study's conclusions are robust.

4.4. Heterogeneity

This study explores the relationship between earnings management and analysts' forecasts from the perspective of heterogeneity. Heterogeneity research is analyzed from two dimensions. The first is the equity pledge (*Pledge*), which represents the behavior of the company's controlling shareholders. If the company's controlling shareholders have an equity pledge at the end of the year, then the *pledge* takes the value of 1; otherwise, it takes the value of 0. The second is the nature of ownership (*SOE*), which represents the attributes of the company's property rights. If the company is a state-owned enterprise, *SOE* takes the value of 1; otherwise, it equals 0. Table 5 shows that the relationship between earnings management and analysts' forecasts differs considerably depending on the controlling shareholders' equity pledge and the nature of firms' property rights. The controlling shareholders' equity pledge further

Table 4
Endogeneity test.

	First Stage DA	Second Stage Atten	Catten	Accur
DA		−2.187***	−1.873***	7.657***
		(−6.59)	(−9.25)	(11.86)
Audit	0.226***			
	(3.97)			
Controls	Yes	Yes	Yes	Yes
Cons	2.619**	4.485**	3.393	3.293***
	(2.25)	(2.18)	(1.47)	(5.59)
Ind	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Adj-R^2	0.693			
Chi2		1723.85	1490.57	1926.53

t statistics are in parentheses.
* = $p < 0.10$,.
** = $p < 0.05$, and.
*** = $p < 0.01$.

Table 5
Heterogeneity analysis.

	(1) Accur	(2) Accur
DA	16.293***	11.075**
	(4.95)	(2.16)
*Pledge*DA*	5.946***	
	(5.19)	
*SOE*DA*		−6.095***
		(−3.17)
Lev	−0.653***	−0.559***
	(−5.36)	(−4.27)
Size	0.318***	0.415***
	(6.13)	(5.76)
Growth	0.016	0.008*
	(0.73)	(1.75)
Ins	0.064***	0.072***
	(9.06)	(7.93)
Roe	0.289	0.316*
	(0.87)	(1.75)
Forecast	−1.996***	−2.103***
	(−17.85)	(−19.07)
Roa	−0.216***	−0.297***
	(−18.76)	(−15.37)
Index	−0.547**	−0.693***
	(−2.39)	(−3.35)
Cons	2.119**	3.007**
	(2.09)	(2.18)
Ind	Yes	Yes
Year	Yes	Yes
N	21,986	21,986
Adj.R^2	0.218	0.294

t statistics are in parentheses.
* $= p < 0.10$,.
** $= p < 0.05$, and.
*** $= p < 0.01$.

enhances the impact of listed companies' earnings management on the accuracy of analysts' earnings forecasts. Simultaneously, the nature of state-owned property rights is conducive to mitigating the impact of earnings management on the accuracy of analysts' earnings forecasts.

5. Conclusions

This study selects China's A-share listed companies from 2015 to 2022 as a research sample to explore the relationship between earnings management, analysts' attention, and earnings forecasts. Our findings indicate that the higher the degree of the company's earnings management, the lower the analysts' attention. Furthermore, the higher the degree of the company's earnings management, the lower the degree of analysts' over-attention. Moreover, the higher the branch's earnings management degree, the lower the precision of analysts' earnings forecasts. Finally, substantial differences such as enterprise property rights exist in the relationship between earnings management and analysts' forecasts.

Therefore, investors should fully consider the issue of enterprises' surplus management when making decisions. Regulators should strengthen the supervision and identification of surplus management behaviors of enterprises, adopt targeted supervision and standardization measures, and increase the cost of their violations. Furthermore, enterprises should strengthen their internal governance, improve their internal control mechanisms, reduce the occurrence of surplus management behaviors, and strengthen the disclosure of information to improve information transparency. Through joint efforts, the healthy development of the capital market can be promoted.

CRediT authorship contribution statement

Bingze Du: Validation, Supervision, Resources, Project administration, Investigation, Formal analysis, Data curation. **Jing Yu:** Supervision, Resources, Methodology, Formal analysis, Data curation, Conceptualization. **Liling Fu:** Writing – original draft, Validation, Resources, Methodology, Investigation, Formal analysis. **Jing Ding:** Supervision, Software, Methodology, Investigation, Funding acquisition.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The authors do not have permission to share data.

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