

The Informativeness of Non-GAAP Earnings: Empirical Evidence on China

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Abstract

In 2019, China piloted the Science and Technology Innovation Board (STIB) to test the practicability of a registration-based system with information disclosure requirements different from those of the approval-based system widely used. Using empirical data, the relationship between the informativeness (measured by earnings persistence and value relevance) of non-GAAP performance measures (core earnings and non-recurring gains and losses), of companies listed in the STIB was explored. The main findings are both measures capture earnings persistence, and core earnings are value-relevant; the sign of the performance measure influences informativeness; the informativeness of non-recurring profits and losses improves after setting the board.

Keywords

Corporate Governance, Informativeness, Non-GAAP Performance Measures, Earnings Persistence, Value Relevance

1. Introduction

This paper aims to provide empirical evidence to investigate the informativeness of non-GAAP performance earnings and non-recurring gains and losses of the companies listed in the Science and Technology Innovation Board.

The informativeness of non-GAAP performance measures is an important research field since it has a significant influence on managerial disclosure decisions, therefore influencing the firm's reputation, investors' decisions, and the regulator's supervision. Prior papers usually split non-GAAP earnings into core earnings and special items (Shiah-Hou & Teng, 2016; Burdekin & Harrison,

2021) and measure the informativeness of performance measures through two dimensions: earnings persistence and value relevance (Curtis et al., 2014; Henry et al., 2020). Jennings & Marques (2011) examined the joint effects of corporate governance and regulation by the Securities and Exchange Commission (SEC) on the disclosure of manager-adjusted non-GAAP earnings in US and showed that prior to regulation, investors were misled by disclosures of non-GAAP earnings made by firms with weaker corporate governance, while there was no such evidence after the SEC intervention. Wang (2018) summarized the development of non-GAAP performance measures in the United States by combing the regulatory history of relevant departments based on the current regulatory framework in the United States, discovering that the non-GAAP earnings and the corresponding non-recurring capture the characteristic of informativeness in A-share companies. Non-GAAP earnings are more informative than non-recurring gains and losses (Wang, 2017). Zhang et al. (2022) showed that the likelihood and frequency of non-GAAP earnings reporting are lower following a going-concern audit opinion (GCO). Young (2014) reviewed the academic and professional debate surrounding non-GAAP earnings reporting by management, arguing that the demand for customized performance reporting is a natural response to constraints imposed by a one-size-fits-all reporting system and that the non-GAAP phenomenon is part of a long-standing debate over the definition and presentation of periodic performance and his work was further discussed by Miller (2014). Venter et al. (2014) measure the value relevance of headline earnings through the coefficient between stock price and headline earnings, stating that headline earnings are more value-relevant than GAAP earnings. Ramakrishnan & Thomas (1998) showed that the price-earnings link is described better by separating components of unexpected earnings and that systematic links develop among current earnings components, future earnings, and stock prices. Richardson et al. (2005) showed that less reliable accruals lead to lower earnings persistence (and that investors do not fully anticipate the lower earnings persistence) leading to significant security mispricing, thus suggesting that there are significant costs associated with incorporating less reliable accrual information in financial statements. McVay (2006) further studied core earnings, while Wieland et al. (2013), using stock price and return data showed that core earnings are more value relevant than GAAP earnings. Cheng (2016) discussed IFRS non-GAAP earnings disclosures and fair value measurement.

This paper starts with the information disclosure system and unique characteristics of the Science and Technology Innovation Board, further explores the disclosure of non-GAAP performance measures under the Science and Technology Innovation Edition, and finally provides some suggestions for the development status of China's capital market and the actual situation of listed companies, and to provide a practical reference for the application and development of non-GAAP financial measures in China's A-share market in the future.

The CSMAR database is used to gather all the available figures of the compa-

nies listed on the Science and Technology Innovation Board. There are two models introduced in this paper. The final sample consists of 858 firm-year observations for the first regression from 2017 to 2020 and 183 firm-year observations for the second model from 2019 to 2020. Also, to test the moderating effect, the whole period is split into intervals before and after the policy.

The results of the empirical research show that both measures are persistent and core earnings are of value relevance. Second, the sign of the performance measure influences informativeness. Third, the informativeness of non-recurring profits and losses improved after the board was set, indicating the pilot policy strengthens information disclosure to some extent.

This study contributes not only to existing literature but also to economic reality. The results of the research build up the foundation for future literature. It provides a new perspective of qualitative research for the new board.

This article is organized as follows: First the main characteristics of China's Stock Markets are briefly presented, placing special emphasis on the STAR market established in 2019 by the Science and Technology Innovation Board. Then a literature review follows, providing a critical analysis of the most representative studies on the informativeness of non-GAAP earnings and the research gaps that this study addresses. Following, the methodology used, and the main results obtained are introduced and discussed against previous studies. Finally, the main conclusions are summarized, the study's practical and academic implications are marked and relevant suggestions for future study are offered.

2. Literature Review and Hypotheses

2.1. Background

China's stock market is divided into Shanghai stock market and Shenzhen stock market (Zhen, 2013). There are four boards in Shanghai Stock Exchange: Shanghai A-share (Main-Board Market), small and medium-sized board, the Growth Enterprises Market and the Science and Technology Innovation Board (SSE).

The official name of A-share is RMB common stock. It is an ordinary share issued by domestic companies for domestic institutions, organizations, or individuals (excluding investors from Taiwan, Hong Kong and Macao) to subscribe and trade in RMB. Small and medium sized enterprise board is a gathering board of small and medium-sized companies set up by Shenzhen Stock Exchange to encourage independent innovation. Companies in this board generally have the characteristics of fast growth of income, strong profitability, good stock liquidity and active trading. Different from the Main-Board Market, the Growth Enterprises Market provides financing channels and growth space for the entrepreneurial enterprises which cannot be listed on the main board market for the time being. In other words, the Growth Enterprises Market is an important supplement to the main board market and also occupies an important position in the capital market.

The above three boards all adopted the approval-based system in which the application materials for listing of enterprises are reviewed by the development and Examination Committee of CSRC. The registration-based system is put on trial by the Science and Technology Innovation Board. The Shanghai Stock Exchange is responsible for the examination of the issuance and listing, and the CSRC decides to approve the registration.

In 2019, the Science and Technology Innovation Board (STAR Market) was set up to deepen capital market reforms, optimize the capital market's basic system and improve capital market functions. Unlike other boards, the STAR Market adopts a registration-based system.

Registration-based system is also called "declaration system". Under this system, the government agencies do not conduct substantive audits on the securities companies to be issued and their value, but only review their public information. They explicitly refuse the unqualified securities issuance, otherwise they will automatically register and take effect after the legal audit time. Therefore, the registration-based system reflects the autonomy and freedom of the market economy.

The main assumption of the approval system is that the audit of the regulatory authorities can exclude the enterprises that do not meet the listing conditions, to ensure that the securities purchased by investors in the securities market are well qualified (Wang, 2020).

The principles of information disclosure include 1) the principle of protecting investors' rights and interests and 2) materiality. The principle of protecting the rights and interests of investors runs through the whole process of information disclosure (Wang, 2018).

The STAR market adopts a combination of mandatory disclosure and voluntary disclosure. Since it is difficult to achieve the intended goal of disclosure by relying solely on a single approach of mandatory disclosure, regulators usually encourage companies to voluntarily disclose more information on their own initiative to fully reveal the company's situation (Zhen, 2019). Under the approval-based system, issuers should make public all the relevant materials for investors to choose and judge, as well as meet the requirements of securities issuance conditions (Chen, 2013).

2.2. Non-GAAP Performance Measures

Non-GAAP performance measure is an adjustment item based on GAAP performance measures. Sometimes, listed companies want to provide detailed external users with the company's operation and sustainable performance level (Baik et al., 2008). By adjusting part of the data, they eliminate temporary, uncontrollable, unrelated, or non-cash items on the operating results. Therefore, Non-GAAP performance measures are introduced. Core earnings, EBITDA, and free cash flow are the most common proxies of non-GAAP performance measures (Wang, 2018).

According to the theory of information asymmetry (Jensen & Meckling, 1976), the information that each trader has in the market is different. For companies and investors, listed companies are often in a strong position because they have additional information (Wang, 2018). Interest asymmetry may lead to agency problems, moral hazards, and adverse selection problems (Jensen & Meckling, 1992).

2.3. The Informativeness of Financial Information

Earnings persistence refers to the likelihood that the earnings level will recur in future periods and thus can reflect the predictive value of the information (Nichols & Wahlen, 2004). This predictive value shows the information can make a difference to the decision made by users and matters as a performance measure.

Non-recurring gains and losses consist of these expenses. Core earnings equals earnings minus non-recurring gains and losses. Thus, we focused on two main components to test the informativeness: 1) non-GAAP earnings and 2) non-recurring profits and losses. The first hypothesis is related to the earnings persistence of non-GAAP performance measures. The hypotheses tested are:

H1: The core earnings of the companies listed in the Science and Technology Innovation Board this year has positive relationship with the earning in the next year.

H2: Non-recurring profits and losses are persistent in the Science and Technology Innovation Board.

H3: The core earnings of the companies listed in the Science and Technology Innovation Board are value relevant.

H4: Non-recurring profits and losses of the companies listed Science and Technology Innovation Board have value relevance.

H5a: Positive core earnings are more persistent than negative core earnings.

H5b: Non-recurring profits are more persistent than non-recurring losses.

H6a: Positive core earnings are more value relevant than negative core earnings.

H6b: Non-recurring profits and losses are more value relevant than non-recurring losses.

H7a: The implementation of Science and Technology Innovation Board strengthens the relation between the core earnings in this year and the core earnings in the next year.

H7b: The implementation of Science and Technology Innovation Board strengthens the relation between the core earnings and the stock prices.

In summary, one of the goals of the Science and Technology Innovation Board is to preserve investors' rights while also improving information quality. Furthermore, non-GAAP disclosure of some performance measures is once again mandatory. The information quality is expected to be influenced to some extent by the more complete, detailed, and strict disclosure rules. This study explores the Science and Technology Innovation Board of non-GAAP perfor-

mance measurements of persistence and value relevance, based on earlier publications such as Wang (2017) and Shiah-Hou & Teng (2016), to investigate the benefits and limitations of disclosure system, as well as to make recommendations for government enhancements. Therefore, the present research focuses on studying the informativeness of non-GAAP earnings of companies listed in the STAR market of China, as this is a newly established market, and no previous relevant studies exist.

Brosnan et al. (2023) reviewed the past 20 years literature on non-GAAP reporting and identified the important existing and emerging research areas concerning non-GAAP earnings disclosures. Table 1 below presents a review of the main relevant studies. Further, with respect to the topic's practical implications Zhang et al. (2023), showed that managers are less likely to report non-GAAP earnings with the increase of stock price informativeness, suggesting that information from stock prices discourages non-GAAP reporting from firm managers and showed that stock price informativeness influences managerial incentive of non-GAAP reporting through two channels: 1) direct monitoring and 2) the improvement in the information environment. Also, a number of studies focused on examining the Big 4 auditing influence to the quality of Non-GAAP reporting (Feng et al., 2022; Dak-Adzaklo et al., 2023).

Table 1. Literature review.

No	Author	Focus	Sample Size and Settings	Key Variables
1	Basu (1997)	re-examines the conservatism principle. Conservatism is interpreted as capturing accountants' tendency to require a higher degree of verification for recognizing good news than bad news in financial statements	25,531 firm-year observations with returns data on the CRSP NYSE/AMEX Monthly data from 1963 to 1990	earnings per share, the stock return for the firm cumulated over its fiscal year, the stock return, a dummy variable presenting the sign of return
2	Curtis et al. (2014)	examines the disclosure of non-GAAP earnings information in quarters containing transitory gains to investigate whether the primary motivation for these managers to disclose non-GAAP earnings is to inform or mislead	1920 firm-quarters samples with transitory gains in the form of net income increasing special items of at least one penny per share from 2004 to 2009	Non-GAAP Earnings Information, Operating Earning, Analyst Actual, Analyst Forecast, Operating Earnings Surprise, Street Earnings Surprise, Transitory Gain, Announcement Return Filing Return, Announcement Difference, Book-to-Market Ratio, Market Value of Equity, Total Assets, Sales, Beta
3	Doyle et al. (2003)	investigates the informational properties of pro forma earnings. This increasingly popular measure of earnings excludes certain expenses that the company deems non-recurring, non-cash, or otherwise unimportant for understanding the future value of the firm	143,462 firm-quarter observations with sufficient Compustat, CRSP from 1988 to 1999	pro forma earnings, operating income, GAAP earnings, special items, MTB, total assets, sales growth

Continued

4	Du & Huddart (2020)	proposes a simple framework for understanding accounting-based stock return regularities	51,490 observations which are all firm-quarters from Compustat quarterly data from 1985 to 2015	firm size, stock return volatility, earning announcement return
5	Entwistle et al. (2010)	explores whether pro forma earnings, GAAP earnings, and I/B/E/S earnings are value relevant and, more important, which in comparative terms has the greatest value relevance	1608 firm-year pro forma earnings observations from 2000 to 2004	return, GAAP earnings, I/B/E/S earnings, price, growth, loss
6	Freeman & Tse (1989)	tests whether investors reevaluate earnings announcements in the light of post-announcement information	12,988 firm-quarterly data	SRW earnings innovations, analyst forecast error, abnormal return
7	Henry et al. (2020)	explores the disclosure of non-GAAP earnings by large, publicly traded companies, and the possible impact of the 2010 change in Regulation G and S-K on corporate reporting behavior	164 firm-year observations of companies listed in the 2014 S&P 100 from 2010 to 2016	descriptive analysis and comparison
8	Isidro & Marques (2021)	examines the role of industry-level product market competition on non-GAAP disclosure decisions	2161 observations that earnings announcement press releases from 2003 to 2011	capital market incentives, industry competition, firm level controls
9	Kolev et al. (2008)	examines the effects of intensified scrutiny over non-GAAP reporting on the quality of non-GAAP earnings exclusions	104,954 firm-quarter observations from the 2nd calendar quarter of 1998 through the 2nd calendar quarter of 2004, allowing for equal periods (13 quarters) before and after the initial SEC intervention	GAAP and non-GAAP earnings, total exclusions, special items, other excusions, future operating inc, sales growth, total assets, earnings volatility, loss, book-to-market-assets, age
10	Leung & Veenman (2018)	examines the incremental information in loss firms' non-GAAP earnings disclosures relative to GAAP earnings	11,867 firm-quarters observations from CRSP/Compustat from 2006 to 2014	total assets, earnings announcement date, income before extraordinary items, earnings per diluted share
11	Marques (2010)	examines the prominence of non-GAAP financial measures in press releases, testing whether managers emphasize these adjusted performance measures relative to GAAP numbers in four different settings where their disclosure helps managers reach strategic earnings benchmarks on a pro forma basis when they would otherwise fall short using GAAP numbers. Moreover, this research investigates the information content of disclosures reconciling non-GAAP to GAAP earnings (and other financial statements)	4234 observations (of which 2473 with non-GAAP disclosures) quarterly earnings press releases of 361 firms listed on the S&P500 from 2001 to 2003	Difference in prominence of the non-GAAP measure minus prominence of the GAAP measure

Continued

12	Marques (2006)	examines the effect of two Securities and Exchange Commission regulatory interventions related to disclosure of non-GAAP financial measures	4504 observations of 361 firms listed on the S&P500 from 2001 to 2003	non-GAAP measures
13	Nichols & Wahlen (2004)	provides important insights for understanding the relevance of financial reporting in three dimensions	90,470 observations of firms listed on the NYSE, AMEX, and NASDAQ exchanges during the period from 1988 to 2002	returns, abnormal returns, earnings changes
14	Shiah-Hou et al. (2016)	examines the possibility that managers mislead investor perceptions through the disclosure of non-GAAP earnings even after SEC intervention (Reg G)	25,291 observations from S&P 1500 firms, excluding financial industries from 2006 to 2011	Merger and Acquisition charges, Extinguished debt charges, impairment of goodwill, Gains or losses on asset dispositions and “below the line” items, Restructuring charges, Acquired in process research and development charges, Other Special items
15	Sloan (1996)	investigates whether stock prices reflect information about future earnings contained in the accrual and cash flow components of current earnings	40,679 firm-year observations from 1962 to 1991	earnings, accruals, cash flow, current assets, current liability
16	Venter et al. (2014)	examines the value relevance of earnings components where there is a mandatory requirement to report generally accepted accounting principles (GAAP) earnings and non-GAAP earnings, and where the items to be eliminated from GAAP earnings are defined in detail	2042 observations of firms listed on the main board of the JSE from 2002 to 2009	book value of equity, the GAAP earnings, headline earnings, headline earnings exclusions
17	Wang (2017)	examines the value relevance and earnings persistence of the non-recurring gains and losses and the incremental value relevance of profits after deduction of extraordinary earnings	17,589 samples which are A-share listed companies in Shanghai and Shenzhen stock exchanges from 2001 to 2015	earnings per share, non-recurring profit and loss per share, core earnings per share, book value of equity per share

Source: Own analysis.

3. Methodology

3.1. Sample Selection

The data comes from the CSMAR database. In this paper, the data of the database are sampled and checked with the financial reports of listed companies. The financial performance measures used in this paper are the standard data disclosed in the financial reports of listed companies. In this paper, Excel software

is used to sort out, match, and calculate the data, and STATA is used to test the regression model (Table 2).

3.2. Earnings Persistence

The possibility that the earnings level would recur in future periods is referred to as earnings persistence. Following Freeman & Tse (1989), the relation between current earnings performance and future earnings performance can be expressed as:

$$Earnings_{t+1} = \alpha_0 + \alpha_1 Earnings_t + \varepsilon_t \quad (1)$$

According to the equation earnings = cashflows + accruals, Sloan (1996) used a disaggregated model to verify his hypothesis. The regression can be replaced by:

$$Earnings_{t+1} = \alpha_0 + \alpha_1 Accruals_t + \alpha_2 Cashflows_t + \varepsilon_t \quad (2)$$

Based on previous earning persistence regressions, we proposed the following regression to test the persistence of the non-GAAP earnings.

$$Earnings_{t+1} = \alpha_0 + \alpha_1 CE_t + \alpha_2 NR_t + \alpha_3 DICE_t + \alpha_4 D_2 NR_t + \alpha_5 D_2 NR_t + \alpha_6 LEV_t + \alpha_7 OWN + \alpha_8 ROE_t + \alpha_9 COVID + \alpha_{10} AGE_t + \varepsilon_t \quad (3)$$

The first empirical model is designed to test hypothesis 1, hypothesis 2, hypothesis 5a, hypothesis 5b and hypothesis 7a. The dependent variable and independent variables used are presented in Table 3 that follows.

Table 2. Sample characteristics.

Firms in STAR MARKET (2017-2020)	286
observations in STAR MARKET (2017-2020)	858 (=286 × 3)
observations with Missing Data	0
Outliers	0
Number of observations in final sample	858
Value relevance	
Firms in STAR MARKET (2019-2020)	286
Firms listed in 2020	146
Firms listed in 2021	77
observations in STAR MARKET (2019-2020)	252 (=286 × 4 – 146 × 4 – 77 × 4)
observations with missing data	(–68)
Outliers	(–1)
Number of observations in final sample	183

Source: Own analysis.

Table 3. List of variables used to test earnings persistence.

Type	Variable Name	Proxy and description
Dependent variable	$Earnings_{t+1}$	earnings in year $t + 1$
Independent Variable	Ce_t	earning excluding non-recurring profit and loss in year t .
Independent Variable	NR_t	non-recurring profit and loss at time t .
Dummy Variable	$D1$	$D1$ is a dummy variable. When $Ce_t < 0$, $D1 = 1$; otherwise, $D1 = 0$.
Dummy Variable	$D2$	$D2$ is a dummy variable. When $NR_t < 0$, $D2 = 1$; otherwise, $D2 = 0$.
Control variable	LEV_t	book leverage
Control variable	OWN	OWN is a dummy variable. When the company is run by the government, $OWN = 1$; otherwise, $OWN = 0$.
Control variable	ROE_t	Return on equity
Control variable	$COVID$	$COVID$ is a dummy variable. When the date of the listing date is after the outbreak of COVID-19, $COVID = 1$; otherwise, $COVID = 0$.
Control variable	AGE_t	AGE is the age of the company, which equals t minus the year when the company was founded.

Source: Own analysis.

3.3. Value Relevance

The model for testing the value relevance of earnings is first designed as followed:

$$Returns = \alpha + \beta Earnings + \varepsilon \tag{4}$$

This regression model allowed us to answer the question of whether earnings are “value relevant”. Basu (1997) relied on the “reverse” regression model:

$$Earnings = \alpha + \beta Returns + \varepsilon \tag{5}$$

This model helps us to answer the question of whether earnings summarize information, as reflected in stock price, in a timely manner.

Then Basu (1997) splits this reverse-regression model based on whether the sign of the returns’ variable is positive or negative.

$$Earnings = \alpha_0 + \alpha_1 + \beta_0 Returns + \beta_1 DReturns + \varepsilon \tag{6}$$

where D is a dummy variable when the stock returns are negative. Typically studies of this sort are based on variations of the following linear price-levels regression:

$$P_t = \alpha_0 + \alpha_1 BVE_t + \alpha_2 EARN_t + \varepsilon_t \tag{7}$$

where P is the market value of a share in the firm at time t , BVE is the book value of equity (per share) and $EARN$ is the GAAP earnings (per share) of the firm.

He constructed the following price model to study the impact of non-recurring profit and loss and net profit after deduction of non-recurring profit and loss on the stock price.

$$P_t = \beta_0 + \beta_1 BVPS_t + \beta_2 COEPS_t + \beta_3 EIEPS_t + \beta_4 D_3 COEPS_t + \text{Control Vars} + \varepsilon_t \quad (8)$$

Based on previous models, we introduced variables that can measure their sign, proposing the following model for studying value relevance.

$$P_t = \beta_0 + \beta_1 BVPS_t + \beta_2 COEPS_t + \beta_3 EIEPS_t + \beta_4 D_3 COEPS_t + \beta_5 D_4 EIEPS_t + \beta_6 LEV_t + \beta_7 GROW_t + \beta_8 OWN + \beta_9 COVID + \beta_{10} AGE_t + \varepsilon \quad (9)$$

The Dependent variable and independent variables (main variables) used are presented in **Table 4** that follows. The test of earnings persistence aims to support hypothesis 1, hypothesis 2, hypothesis 5a, hypothesis 5b and hypothesis 7a. The descriptive statistical results of earnings persistence model variables are presented in **Table 5** below.

Table 4. List of variables used to test value relevance.

Type	Variable Name	Proxy and description
Dependent variable	P_t	earnings in year t
Independent variable	$BVPS_t$	earning excluding non-recurring profit and loss in year t
Independent variable	$COEPS_t$	the earnings per share after deducting non-recurring profit and loss (per share) of the firm at time t
Independent variable	$EIEPS_t$	the non-recurring profit and loss (per share) at time t
Dummy Variable	$D3$	$D3$ is a dummy variable. When $COEPS < 0$, $D3 = 1$; otherwise, $D3 = 0$.
Dummy Variable	$D4$	$D4$ is a dummy variable. When $EIEPS < 0$, $D3 = 1$; otherwise, $D3 = 0$.
Control variable	LEV_t	Leverage, total assets scaled by total debt
Control variable	$GROW_t$	$GROW_t$ representing the growth opportunity of the company. Here I choose Tobin Q as the proxy of growth.
Control variable	OWN	OWN is a dummy variable. When the company is run by the government, $OWN = 1$; otherwise, $OWN = 0$
Control variable	$COVID$	$COVID$ is a dummy variable. When the date of the listing date is after the outbreak of COVID-19, $COVID = 1$; otherwise, $COVID = 0$.
Control variable	AGE_t	AGE is the age of the company, which equals the year since company was founded.

Source: Own analysis

Table 5. Descriptive statistics—earnings persistence.

Variable	Panel A: STAR			Panel B: CONTROL		
	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
<i>Earnings</i>	858	83.412	302.031	679	744.835	3574.037
<i>CE</i>	858	76.836	258.495	679	645.661	3464.097
<i>NR</i>	858	6.576	129.721	679	186.802	535.839
<i>D1</i>	858	0.084	0.277	679	0.277	0.448
<i>D2</i>	858	0.178	0.383	679	0.1	0.3
<i>D1CE</i>	858	-18.233	99.645	679	239.136	999.106
<i>D2NR</i>	858	-12.147	97.549	679	-28.28	205.13
<i>LEV</i>	858	0.358	0.209	679	0.505	0.425
<i>OWN</i>	858	0.056	0.23	679	0.193	0.395
<i>ROE</i>	858	0.147	0.567	679	0.009	0.352
<i>COVID</i>	858	0.755	0.43	679	0	0
<i>AGE</i>	858	11.538	5.007	679	7.027	10.167

Source: Own analysis.

4. Results

This paper uses OLS regression model to investigate the relationships.

4.1. Earnings Persistence

The test of earnings persistence aims to support hypothesis 1, hypothesis 2, hypothesis 5a, hypothesis 5b and hypothesis 7a. The descriptive statistical results of earnings per-sistence model variables are presented in **Table 5** above.

Table 6 below, shows the correlation coefficient matrix of the earnings persistence model. The coefficient 0.777 of core earnings in year t and earnings in year $t + 1$ is bigger than 0.443, that of non-recurring gains and losses in year t and earnings in year $t + 1$. We can predict that the persistence of the core earnings is stronger than non-recurring gains and losses. Thus, it could be concluded that the implementation of STAR market is within expectation and the mandatory disclosure of non-GAPP mandatory disclosure of non-GAAP performance measures is necessary. 0.248 shows a negative correlation between the negative core earnings in year t and the earnings in year $t + 1$. Furthermore, the factor 0.096 can be used as predictive evidence for forecasting the relation between non-recurring losses in year t and earnings in year of $t + 1$. As for the control variables, there is no predictive relation between LEVERAGE and Earnings in year $t + 1$. OWN, ROE and AGE show significant positive relation with Earnings in year $t + 1$. However, the opposite pattern could be found in COVID, implying the macroeconomic influence is harmful to companies' profitability.

Table 7 below presents the Multicollinearity tests for earning management by means of Variance Inflation Factor (VIF) values. All the values are below the threshold of 10. This evidence is consistent with no severe multicollinearity for the first model.

Table 6. Pearson correlation matrix—earnings persistence.

	<i>EARNINGS</i>	<i>CE</i>	<i>NR</i>	<i>D1CE</i>	<i>D2NR</i>	<i>LEV</i>	<i>OWN</i>	<i>ROE</i>	<i>COVID</i>	<i>AGE</i>
<i>EARNINGS</i>	1									
<i>CE</i>	0.777***	1								
<i>NR</i>	0.443***	0.113***	1							
<i>D1CE</i>	0.248***	0.453***	-0.088***	1						
<i>D2NR</i>	0.096***	-0.036	0.770***	0.089***	1					
<i>LEV</i>	-0.015	0.053	-0.154***	-0.066*	-0.266***	1				
<i>OWN</i>	0.138***	0.136***	0.124***	-0.138***	0.025	0.153***	1			
<i>ROE</i>	0.153***	0.162***	0.147***	0.280***	0.203***	-0.156***	0.004	1		
<i>COVID</i>	-0.160***	-0.193***	-0.045	-0.102***	-0.041	0.239***	0.032	-0.082**	1	
<i>AGE</i>	0.075**	0.063*	0.102***	0.151***	0.125***	-0.001	0.029	0.104***	0.04	1

Source: Own analysis. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 7. Multicollinearity tests—earnings persistence.

	VIF	1/VIF
<i>CE</i>	3.14	0.319
<i>NR</i>	3.1	0.322
<i>D1CE</i>	1.68	0.594
<i>D2NR</i>	1.6	0.623
<i>LEV</i>	1.19	0.837
<i>OWN</i>	1.15	0.872
<i>ROE</i>	1.12	0.896
<i>COVID</i>	1.11	0.903
<i>AGE</i>	1.05	0.955

Source: Own analysis

Normality of the residuals is checked by Skewness/Kurtosis test in the residuals (to determine whether they are consistent with the normal distribution). Under the null hypothesis the residuals are normally distributed. The null hypothesis of normality is rejected when the p -value < 0.05 . This indicates that the residuals of these models are normally distributed.

In order for OLS method to be efficient, the error terms of the model should be uncorrelated and should have a constant variance. When this requirement does not hold, heteroscedasticity exists. The Breusch-Pagan homoscedasticity test Chi2 for earnings persistence was estimated 206.238 (Heij et al., 2004). For the models in all intervals, the p -value of the test is less than 0.05. Thus, the null hypothesis for homoscedasticity is rejected.

In this paper, Stata software was used to do OLS regression test on panel data. In the test of earnings persistence, the experimental group (STAR group) was divided into two-time intervals of 2017-2018 and 2019, and the control group was divided into the same intervals for comparison. The first interval is the period before China set up the STAR market while the second one is the period af-

ter the pilot policy. **Table 8** below contains the results for testing H1, H2, H5a, H5b and H7a examining earnings persistence, from where there are evidence supporting H1, H2 and H5b while there is no evidence shown for H5a and H7a. The opposite conclusions emerge because of the outbreak COVID in 2019. Even though we introduced a control variable related to the pandemic, no significant result is shown in the table. Thus, further research could shed light to this issue.

Table 8. Results for hypotheses testing H1, H2, H5a, H5b and H7a—earnings persistence.

	Panel A: STAR		Panel B: CONTROL		
	Variable	Coef.	St.Err.	Coef.	St.Err.
Interval 1	<i>CE</i>	1.094***	0.028	0.924***	0.023
	<i>NR</i>	1.237***	0.102	0.27	0.194
	<i>D1CE</i>	-0.03	0.072	-0.363**	0.144
	<i>D2NR</i>	-0.811***	0.119	-0.588	0.369
	<i>LEV</i>	-85.791***	26.235	-177.01	202.403
	<i>OWN</i>	0.936	24.158	486.698**	188.187
	<i>ROE</i>	9.531	8.867	-612.231	463.073
	<i>COVID</i>	-17.027	12.638	0	.
	<i>AGE</i>	1.731	1.074	-5.419	7.876
	<i>Constant</i>	31.513*	18.284	-31.658	150.67
Interval 2	<i>CE</i>	0.917***	0.063	0.88***	0.056
	<i>NR</i>	2.529***	0.135	1.071***	0.268
	<i>D1CE</i>	0.391**	0.182	0.927***	0.221
	<i>D2NR</i>	-2.519***	0.284	-2.943**	1.473
	<i>LEV</i>	-41.769	95.568	-492.34	548.336
	<i>OWN</i>	-59.303	63.048	0	.
	<i>ROE</i>	-9.124	37.902902	-4451.97***	631.769
	<i>COVID</i>	28.931	37.887	0	.
	<i>AGE</i>	-1.24	2.826	0	.
	<i>Constant</i>	46.249	46.391	483.581*	287.395
TOTAL	<i>CE</i>	1.002***	0.029	0.912***	0.022
	<i>NR</i>	2.094***	0.081	0.62***	0.155
	<i>D1CE</i>	0.139*	0.078	0.11	0.118
	<i>D2NR</i>	-1.751***	0.109	-0.753**	0.351
	<i>LEV</i>	99.627***	31.359	-377.475*	195.668
	<i>OWN</i>	-27.278	27.409	494.94**	203.149
	<i>ROE</i>	8.244	11.31	-2190.277***	357.899
	<i>COVID</i>	0.972	14.701	0	.
	<i>AGE</i>	0.742	1.224	-10.113	7.897
	<i>Constant</i>	40.107**	20.377	231.495*	128.645

Source: Own analysis. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 9 contains the results of the robustness regression for the hypotheses related to earnings persistence. The coefficients of the core earnings and non-recurring profits are significant at 1% level in all periods. The results of the OLS regression model indicate that both non-GAAP performance measures capture the characteristic of persistence, strongly supporting hypothesis 1 and hypothesis 2. Likewise, by comparing 2.104 and 0.341 (2.104 - 1.763), it is not hard to draw the conclusion that the non-recurring profits and losses are more persistent when it is positive than negative (H5b). There is no evidence for supporting hypothesis 5a since the coefficients of all the negative core earnings are not significant. Furthermore, 0.926 is smaller than 1.088 while 2.551 is bigger than 1.215. This contradictory phenomenon related to the persistence of different non-GAAP components cannot be treated as a convince of hypothesis 7a.

4.2. Value Relevance

The test of value relevance aims to support hypothesis 3, hypothesis 4, hypothesis 6a, hypothesis 6b and hypothesis 7b.

Table 10 below shows the descriptive statistical results of the earnings persistence model variables.

Table 11 below indicates that BVPS, COEPS, EIEPS and GROW positively and significantly correlate with P . The correlation coefficient between the book value of equity and the stock price P is 0.823, indicating a positive association, according to the Pearson test results. As a result, we should expect the stock price to favorably reflect the rise or decline in the company's owner's equity. The non-recurring profit and loss EIEPS and the net profit share price P have a correlation coefficient of 0.663, indicating a positive relationship. Therefore, it can be predicted that the non-recurring profit and loss have a low-value correlation

Table 9. Robustness test results—earnings persistence.

<i>Earnings</i>	2017-2018	2019	2017-2019
<i>CE</i>	1.088***	0.926***	1.007***
<i>NR</i>	1.215***	2.551***	2.104***
<i>D1CE</i>	-0.012	0.362*	0.126
<i>D2NR</i>	-0.788***	-2.555***	-1.763***
<i>LEV</i>	-90.743***	-26.726	-96.855***
<i>OWN</i>	-1.620	-54.679	-25.284
<i>ROE</i>	9.599	-6.677	8.333
<i>COVID</i>	-15.910	19.511	-0.432
<i>AGE</i>	1.633	-1.188	0.795
<i>SIZE</i>	4.244	-8.849	-3.119
<i>Constant</i>	-51.144	229.279	102.395

Source: Own analysis. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 10. Descriptive statistics—value relevance.

Panel A: STAR					
Variable	Obs	Mean	Std.Dev.	Min	Max
P_t	183	82.252	125.011	5.61	1410
$BVPS_t$	183	11.315	9.6	0.019	106.711
$COEPS_t$	183	1.283	2.457	-2.96	21.43
$EIEPS_t$	183	1.102	2.287	-1.98	18.91
$D3$	183	0.182	0.297	-1.06	2.52
$D4$	183	0.049	0.217	0	1
$D3COEPS_t$	183	0.038	0.192	0	1
$D4EIEPS_t$	183	-0.047	0.255	-1.98	0
LEV_t	183	-0.012	0.107	-1.06	0
$GROW_t$	183	0.205	0.149	0.02	0.77
OWN	183	2.307	1.445	1.032	11.042
AGE_t	183	0.044	0.205	0	1
$COVID$	183	0.142	0.289	-2.94	1.244
P_t	183	0.246	0.432	0	1
$BVPS_t$	183	11109	4.52	2	24
Panel B: Control					
Variable	Obs	Mean	Std.Dev.	Min	Max
P_t	334	16.93	25.306	1.17	267.51
$COEPS_t$	334	0.29	0.664	-4.85	3.92
$EIEPS_t$	334	0.091	0.963	-5.88	5.29
$D3$	334	0.159	0.366	0	1
$D4$	334	0.419	0.494	0	1
$D3COEPS_t$	334	-0.076	0.401	-4.85	0
$D4EIEPS_t$	334	-0.251	0.621	-5.88	0
LEV_t	334	0.464	0.204	0.042	0.979
$GROW_t$	334	1.897	1.264	0.818	8.464
OWN	334	0	0	0	0
AGE_t	334	20.641	4.142	9	33
$COVID$	334	0.623	0.485	0	1

Source: Own analysis.

Table 11. Pearson correlation matrix—value relevance.

	<i>P</i>	<i>BVPS</i>	<i>COEPS</i>	<i>EIEPS</i>	<i>D3COEPS</i>	<i>D4EIEPS</i>	<i>LEV</i>	<i>GROW</i>	<i>OWN</i>	<i>COVID</i>	<i>AGE</i>
<i>P</i>	1										
<i>BVPS</i>	0.823***	1									
<i>COEPS</i>	0.691***	0.718***	1								
<i>EIEPS</i>	0.663***	0.717***	0.529***	1							
<i>D3COEPS</i>	0.057	0.133*	0.204***	0.323***	1						
<i>D4EIEPS</i>	0.025	0.119	0.133*	0.432***	0.696***	1					
<i>LEV</i>	-0.135*	0.227***	-0.051	-0.158**	-0.184**	0.263***	1				
<i>GROW</i>	0.298***	0.075	0.057	0.303***	0.054	0.027	-0.125*	1			
<i>OWN</i>	-0.091	-0.122	-0.06	-0.046	0.039	0.024	0.342***	-0.082	1		
<i>COVID</i>	0.055	-0.024	0.111	-0.063	0.321***	-0.186**	0.284***	0.212***	0.002	1	
<i>AGE</i>	-0.114	-0.089	-0.122	-0.11	0.036	0.001	0.240***	-0.035	0.066	-0.011	1

Source: Own analysis. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

or no value correlation. The correlation coefficient between corps and stock price *P* is 0.691, showing a significant moderate correlation, and its correlation coefficient is slightly larger than that of non-recurring profit and loss. *LEV* has a negative relation with stock price at the significant level of 10%. The coefficient for *LEV* is -0.135. The coefficient for the variable *GROW* is 0.298 (***) indicating that *GROW* has a positive relation with stock price at the significant level of 1%.

The test for multicollinearity by means of Variance Inflation Factor (VIF) values is presented in **Table 12** below. All of the values are below the threshold of 10. This evidence is consistent with no severe multicollinearity for the second model which tests value relevance.

The normality of the residuals is checked by Skewness/Kurtosis tests and the adj chi2 is 23.03 with prob 0.001. As the null hypothesis of normality is rejected when the *p*-value < 0.05, it indicates that the residuals of these models are normally distributed.

The Breusch-Pagan was used as homoscedasticity test, and a chi2 value of 195.33 with prob 0.000 was estimated (*p*-value < 0.05). As the *p*-value of the test is less than 0.05, the null hypothesis for homoscedasticity is rejected.

Stata software was used to do OLS regression to test panel data. Firm and year. In the test of earnings persistence, the experimental group (STAR group) was divided into two-time intervals of 2019 and 2020, and the control group was divided into the same intervals for comparison. The first interval is the period before China set up the STAR market while the second one is the period after the pilot policy. **Table 13** presents the results for testing H3, H4, H6a, H6b and H7b examining value relevance, and shows that there are evidence supporting H3, H6b and H7b while there is no statistically significant result shown for H3 and

opposite results are shown to reject H7a. The coefficient of COVID in 2019 to 2020 is statistically significant at 10% level. This shows a negative impact of the COVID-19 on the stock price.

Table 14 below shows the results of the robustness regression for the value relevance hypotheses. In the OLS regression model, the coefficients (16.495, 10.406) in 2019 and total period of COEPS are statistically significant at 1%, which gives convincing support for hypothesis 3. Only the coefficient in the total period is significant at 10% level, standing for hypothesis 4. Hypothesis 6a and hypothesis 6b are rejected since there are no significant results for negative core earnings per share and non-recurring loss per share at 10% level. Similarly, there is no result supporting hypothesis 7.

4.3. Summary of Results

Table 15 below provides an overview of the results for all tested hypotheses. The main findings are: Hypothesis 1 and hypothesis 2 are supported by the regression results in this paper. Both non-GAAP earnings and the corresponding exclusions capture the characteristic of persistence. Consistent with the conclusions of [Burgstahler et al. \(2002\)](#), this paper further confirmed that non-recurring gains and losses are not zero persistent. [Venter et al. \(2014\)](#) found that the non-GAAP earnings are of value relevance. Similarly, the non-GAAP earnings of those companies listed in the STAR market are value relevant, standing for hypothesis 3 ([Li, Su, Dong, & Zhu, 2018](#)). There are significant coefficients for non-GAAP earnings. Hypothesis 5b is accepted in this paper. In consistency with [Wang \(2017\)](#), the non-recurring gains are more persistent than non-recurring losses. We considered coronavirus may be one of the reasons for this unusual result. The economic depression caused by the epidemic makes the managers intentionally disclosure beneficial information. Hypothesis 7b is

Table 12. Multicollinearity test—value relevance.

	VIF	1/VIF
<i>BVPS</i>	4.07	0.246
<i>COEPS</i>	3.49	0.286
<i>EIEPS</i>	2.63	0.381
<i>D3 COEPS</i>	2.33	0.428
<i>DAEIEPS</i>	2.24	0.446
<i>LEV</i>	1.61	0.622
<i>GROW</i>	1.35	0.743
<i>OWN</i>	1.32	0.760
<i>COVID</i>	1.20	0.831
<i>AGE</i>	1.14	0.876

Source: Own analysis.

Table 13. Results for hypotheses testing H3, H4, H6a, H6b and H7b—value relevance.

	Variable	Panel A: STAR		Panel B: CONTROL	
		Coef.	St.Err.	Coef.	St.Err.
2019	<i>BVPS</i>	2.54***	0.94	0.762	0.542
	<i>COEPS</i>	17.07***	3.155	6.986*	4.205
	<i>EIEPS</i>	48.335	39.11	23.33***	2.522
	<i>D3COEPS</i>	-78.683	78.91	14.264**	6.192
	<i>D4EIEPS</i>	65.431	150.651	-19.595***	3.823
	<i>LEV</i>	62.886*	35.66	0.464	6.372
	<i>GROW</i>	88.868***	11.863	1.48	0.92
	<i>OWN</i>	5.363	20.163	0	.
	<i>COVID</i>	-9.51	10.81	0.526	2.253
	<i>AGE</i>	0.508	0.879	-0.118	0.277
	<i>Constant</i>	-146.439***	27.751	1.745	9.395
2020	<i>BVPS</i>	11.374***	1.343	1.734*	0.917
	<i>COEPS</i>	5.637	4.145	6.817	5.78
	<i>EIEPS</i>	-11.159	36.875	49.767***	3.574
	<i>D3COEPS</i>	-25.669	32	42.795***	7.985
	<i>D4EIEPS</i>	-3267.584	6967.689	-46.193***	5.23
	<i>LEV</i>	26.263	63.874	0.532	10.374
	<i>GROW</i>	25.963***	4.794	-1.444	1.689
	<i>OWN</i>	25.445	37.907	0	.
	<i>COVID</i>	23.54	19.782	2.836	3.501
	<i>AGE</i>	-0.685	1.725	-0.075	0.409
	<i>Constant</i>	-133.621***	37.32	-2.279	13.141
TOTAL	<i>BVPS</i>	7.847***	0.954	0.983*	0.547
	<i>COEPS</i>	10.497***	3.034	8.524**	3.696
	<i>EIEPS</i>	47.124	28.539	37.812***	2.329
	<i>D3COEPS</i>	-6.82	26.679	27.406***	5.232
	<i>D4EIEPS</i>	-122.169*	69.079	-34.233***	3.465
	<i>LEV</i>	-7.279	38.626	-5.306	5.854
	<i>GROW</i>	19.821***	3.605	-0.358	0.931
	<i>OWN</i>	14.976	24.292	0	.
	<i>COVID</i>	23.717*	12.199	2.235	2.147
	<i>AGE</i>	-0.514	1.074	-0.161	0.26
	<i>Constant</i>	-73.476***	21.344	4.635	8.391

Source: Own analysis. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 14. Robustness test—value relevance.

<i>VARIABLE</i>	2019	2020	2019-2020
<i>BVPS</i>	2.449***	11.209***	7.749***
<i>COEPS</i>	16.495***	5.559	10.406***
<i>EIEPS</i>	52.862	-9.45	47.78*
<i>DB COEPS</i>	-27.056	-23.92	-2.938
<i>DAEIEPS</i>	-39.982	-2597.313	-138.237*
<i>LEV</i>	38.971	2.123	-19.532
<i>GROW</i>	95.209***	24.969***	19.498***
<i>OWN</i>	-16.178	9.106	4.891
<i>COVID</i>	1.957	22.994	26.419**
<i>AGE</i>	0.881	-0.466	-0.37
<i>SIZE</i>	15.182**	10.643	6.295
<i>Constant</i>	-480.831***	-354.719	-205.766

Source: Own analysis. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 15. Summary of main findings.

Hypothesis	Findings
H1	Coefficient significant (p -value < 0.01) in hypothesized direction, supported
H2	Coefficient significant (p -value < 0.01) in hypothesized direction, supported
H3	Coefficient significant (p -value < 0.01) in hypothesized direction, supported
H4	Coefficient not significant, not supported
H5a	Coefficient significant (p -value < 0.05) in opposite direction, not supported
H5b	Coefficient significant (p -value < 0.01) in hypothesized direction, supported
H6a	Coefficient not significant, not supported
H6b	Coefficient not significant, not supported
H7a	Coefficient significant (p -value < 0.01) in opposite direction, not supported
H7b	Coefficient significant (p -value < 0.1) in hypothesized direction, supported

Source: Own analysis.

supported in the expected direction, showing that the value relevance of companies listed in the STAR market are stronger. Since there is nearly no quantitative research about the informativeness relevant to the STAR market. This finding serves as a reference for future literature. The result is in the opposite direction

of hypothesis 5a. This finding is contradictory with previous literature (Basu, 1997) as they found the positive components of earnings are more persistent than negative ones. Likewise, the results for testing hypothesis 7a is statistically significant but in an opposite direction, suggesting the persistence of the non-GAAP earnings decreases after the pilot policy. We considered coronavirus might be a factor which influence the performance of capital market (Burdekin & Harrison, 2021). There are no statistically significant results of the experimental group supporting H4, H6a and H6b. However, H6b can be proved by the results of the control group.

5. Conclusion

In 2019 the Science and Technology Innovation Board introduced optimizing the capital market system. This entirely new board is different from previous boards not only in terms of the listing conditions but also from information disclosure requirements. One of the most important purposes is to protect the investors rights tightly related to information disclosure. Investors are sometimes not competent enough or have limited time and energy to capture and understand all the information. Therefore, they will fixate the non-GAAP performance measures that better reflect a company's economic reality than GAAP performance measures do. Therefore, this paper focuses on non-GAAP performances, especially core earnings and non-recurring profits and losses. Previous scholars always examined informativeness from two dimensions: persistence and value relevance. In that, we measure the informativeness of both core earnings and non-recurring profits and losses through these two dimensions separately. Meanwhile, A-share companies from industries are selected as the control group.

The earnings persistence is tested by examining the correlation between core earnings in year t and earnings in year $t + 1$. At the same time, the value relevance is measured by finding the relation between the stock price and the core earnings per share in the same year. The sensitivity of the magnitudes of the characteristics when the sign of the numbers is less than zero is also investigated.

The main findings are stated as follows. Firstly, the regression results show that the core earnings are persistent and value relevant and the non-recurring profits and losses are persistent, indicating that the non-GAAP earnings, and their exclusions, is informative in the STAR market. Secondly, the sign of the non-GAAP performance measure influences its informativeness. Thirdly, as predicted, the informativeness of non-recurring profits and losses is stronger after the pilot policy was implemented.

Therefore, this paper contributes to academic research on the topic in three dimensions. First, the regression results provide the statistical foundation for future literature. Secondly, this paper also provides a new perspective of the decomposition of GAAP performance measures. Thirdly, introducing the dummy variable remains an inspiration for future scholars to go deeper about this topic.

The main limitation of this research is as follows: First, a causal relationship between the variables was not evidenced, only associations. This implies that the results may be influenced by randomness. Secondly, the figures for testing value relevance before 2019 are hard to find, and therefore it was feasible to compare pre-STAR and post-STAR markets. To make up for this restriction, the results were compared with the control group after 2019. Future research could resolve the above issues. Moreover, future research could introduce industry variables and other additional factors as control variables in the regression model. Thirdly, the informativeness of the non-recurring profits and losses is even more significant than that of core earnings. This result is inconsistent with the control group. The company's status might be the first reason for the unexpected result since companies in the STAR market are start-ups while the control group contains a loss of mature companies. In addition, it is expected that the coronavirus influences the development of these companies to some extent. Future research could consider these two influences.

Furthermore, as this is the first study on the informativeness of non-GAAP Earnings of companies listed on the STIB, its implications are particularly important to investors, auditors and the regulator of the STAR market. With China's capital market development, more and more listed companies are expected to adopt non-GAAP financial measures. To maintain a good information disclosure environment and promote the healthy development of the securities market, adequate supervision and guidance is necessary.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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