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An empirical study of the earnings–returns association: an evidence from China's A-share market

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Abstract

This paper aims to investigate the returns–earnings association in the context of the Chinese capital market. Previously, the investigations brought about disputable outcomes concerning the handiness of models utilizing earnings levels or earnings changes as the informative factors. In this investigation we create theories from the slack structure between stock returns and earnings and perform an empirical test. In an introductory context, this study examines the above relationship applying three models using data from CSMAR database of Chinese listed companies A shares over the sample period of 10 years 2007–2016. The results demonstrated a significant value relevancy of accounting earnings. Specially, in the Chinese stock market the change in the earnings model interprets the stock returns less than earnings level model. Furthermore, the use of cross-sectional accumulated data results in a enormous increase in the explanatory power of earnings for returns yielding more significant earnings response coefficients. The explanatory power of the model that included both variables was (1.17%) that is more than the result of using one explanatory variable in the model implemented for all years and all companies, whether the variable was the earning level (1.03%) or the change in earning (0.75%). The findings recommend that future research should control for the impacts of the temporal increase in market returns before making value relevance inferences from the debilitating association between earnings and returns. The paper contributes to the incomplete framework of research on returns–earnings association as the main driver for the temporal reduction in value relevance of earnings.

Keywords: Chinese stock market, Stock returns, Change in earrings, Earnings response coefficients

Introduction

The relationship between price and earnings is one of the most studied in the last decades. However, this kind of studies is still relevant to this day. Since the original work of Ball and Brown [1], various investigations have archived a positive relationship between earning changes and stock returns at the firm level. This positive affiliation has for the most part been translated as recommending that income changes are useful about changes in future money streams and along these lines affect current stock costs. In his in-depth review, Lev [20] questioned the utility of earning in interpreting the change in stock return, concluded that the earnings' explanatory power was weak and called researchers to identify the factors contributing to that outcome. Strong and Walker [30] suggest that the weak in explanatory power of earnings on returns is due to the use of a search model constrained in the study of the returns–earnings relationship, which does not allow the coefficients of the regression model to change over time and between companies (cross-sectional). Some researchers attributed this weakness to transient components in earnings [19, 26].

Kothari et al. [18] find that, at the aggregate level, advertise returns are adversely connected with contemporaneous aggregate earning changes. The distinct difference between the firm-level and market-level proof

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displays a riddle and has evoked follow-up thinks about endeavoring to more readily comprehend the connection among income and returns [3, 10, 28, 29]. Some studies document that the overall changes in earnings are negatively correlated with the returns [18, 27]. Other explanations have also shown that earnings do not reflect all events affecting the company value. Another researchers have tried to limit this problem and its effect on the returns–earnings relationship by testing the relationship between calculated returns for a period of more than one fiscal year with earnings as did [13] or limit it by introducing other accounting variables with earnings as well [21]. Relationship between earnings and stocks returns is one of the research areas which received wide attention in empirical research based on the financial market since it began scientific research on the subject of the relationship between stock returns and earnings in study of Ball and Brown [1].

In the current study, one of the causes of poor relationship between returns and earnings will be tested. By reference to the relationship, the study refers to the nature of the independent variable used to explain the change in earnings per share. Previous earnings–returns relationship has used change in EPS divided by market price of shares at the beginning of the study window to explanation changes in stock returns. However, based on Easton and Harris [12] and Ohlson [24], the basic variable for interpreting the change in stock return is the level of earnings per share divided by the share price at the beginning of the study window. Therefore, we believe that one of the reasons for the weak earnings–returns relationship is a mistake in the relationship specification. In the purpose of finding out the results for this paper which proposed some questions as an attempt to find the solutions and empirical results, what is the better specification for relationship between market return of share and accounting earnings? What are the implications of this relationship in the case it has been measured based on classified groups according to the earnings–returns relationship? Are stock prices preceding accounting earnings when they reflect the appropriate information to determine the value of the business?

This study aims to test the better specification for relationship between market returns and earnings and to test the impact of this relationship in the case have been measured based on classified groups according to the earning attributed to the price. This paper is divided into two parts; the first section is the introduction. This part introduces the research background and significance of this paper. "China's capital market overview" section shows overview of China's stock market profile. "Literature review and hypotheses development" section discusses the literature review and hypotheses development. "Data analysis" section discusses data analysis; this part describes sample selection and provides descriptive information and the empirical study. And finally "Conclusion" section is the conclusion.

China's capital market overview

The development of China's capital market is closely related to China's economic reform and has been promoted by it and contributed to economic development. A historical review of the development of China's capital markets shows that China's economic liberalization and reforms since the late 1970s have spawned China's capital markets. With the development of China's market economy, the demand for more market-oriented resource allocation continues to grow, leading to the gradual establishment and development of China's capital market.

Looking back, China's capital market has gone through three stages of development: the first stage: from the beginning of 1978 to 1992, China launched a comprehensive economic reform, and with the establishment of Chinese enterprises, China's capital market began to rise. The second phase: from 1993 to 1998, the establishment of the China Securities Regulatory Commission (CSRC) was a milestone; China integrated the capital market and regulatory system. The regional pilot program for regulatory reform has been expanded nationwide, and national capital markets have begun to emerge and develop. The third stage: starting from 1998, the promulgation of the Securities Law is a key milestone, standardizing and strengthening the legal status of China's capital market in the economy and carrying out a series of major reforms to promote further development.

In the past decade, the Chinese stock market has made tremendous progress. By the end of 2012, the total number of listed companies reached 2602, and the investors account exceeded 200 million. The total market value of the stocks exceeded RMB 23 trillion. The number of investors opened accounts for 211 million. The Chinese stock market has become the most important part of the Chinese economy. At the same time, the market system has been continuously improved, and the market function has been continuously enhanced. Today, China is the second largest economy in the world. The capital market has become an important part of China's socialist market economy system, and it has strongly supported and promoted China's economic and social reform and development.

Literature review and hypotheses development

An ongoing stream of research inspects the connection between changes in earnings and stock price at the aggregate level [10], and there have been calls for further research around there [2]. The scientific research

on the return–earnings relationship began with Ball and Brown [1], which revealed a positive relationship between returns and earnings. This study opened the way for researchers to study the aspects of this relationship in terms of its importance, specifications, stability and strength. While Ball and Brown [1] used a model which the returns rely on the unanticipated earning signal, 11 years later [4] added to the accounting literature that the change in return could be explained by the importance of unexpected changes in earnings. That is, the greater the change in unexpected earnings, the greater the change in the unexpected returns. Thus, accounting standards for earnings have become meaningful or have information content. However, contrary to company-level research, recent work documents the inverse relationship between earnings changes and market returns [16, 18, 27]. These studies show that aggregate return changes are inversely related to aggregate return over the same period.

The researchers presented a number of explanations for that negative result. Some of the studies suggest that the negative association between earnings and returns is due to a negative association between expected earnings and expected returns [7, 8, 15, 27, 28]. An attempting to test specification relationship model between stock returns and earnings, and whether adding variable of the earning level to the relationship model increase the explanatory power of the model [12]. The researcher used several models; the first model included a relationship between stock returns and the change in earnings; the second model involves relationship between stock returns and the level of earnings; in the third model, they used both variables: the change in the earnings and level of earnings. Their study has shown that using variable of earnings level explains the stock returns are greater than the change in the degree of earnings, and that both variables contribute to the interpretation of stock returns in the US market. In this regard, there are two models.[1] Study of Ohlson and Shroff [25] also tested the relationship level between stock returns and earnings. The results of this study supported the earning level variable ability to interpret stock returns, and this variable capability outweighs the explanatory capacity for changing in earnings and then only in the event that all of the accounting earnings and stock returns are unexpected or unpredictable.

Contrary to the negative correlation between changes in aggregate return and stock returns over the same period, Bonsall et al. [5] who show that company-level management forecasts for leading companies are positively correlated with the total amount of stock return over the same period. Other studies show that the explanatory variable of stock returns in the model of the relationship between accounting earnings and stock returns is the unexpected earning variable. Since unexpected earnings represent an unobservable variable, a representative of that invisible variable must be found. Maio [22] studied the long haul relationship of stock return, income and earnings. This examination manages the aberrant relationship of the income from market return and benefits development through restricted association with the present esteem. The outcomes demonstrate that development benefit can be anticipated by return. As such benefit development cannot be anticipated dependent on the adjustment consequently.

Another clarification for the low R^2 in the return–earnings association shows that there is no genuine endeavor being made to scrutinize the nature of announced income numbers preceding relating them with returns [11]. Choi et al. [8] evidence suggests that aggregate earnings changes are more predictable than firm-level changes. Moreover, this hypothesis suggests that the negative correlation between earnings and returns is due to a negative correlation between expected earnings and expected returns. In spite of the fact that investigation of the intertemporal variety in the aggregate return–earnings connection in the USA gives understanding into what drives the aggregate return–earnings connection, such an examination is limited to a solitary economy with a moderately homogenous legitimate and administrative condition after some time. A universal setting offers a rich chance to misuse contrasts in institutional qualities to additionally propel our comprehension of the connection between aggregate earning and stock returns. There is, in any case, shockingly sparse worldwide research on this point, except for He and Hu [15], who explore the aggregate return–earnings affiliation globally and reason that the negative affiliation is one of a kind to the USA. The positive relationship in our example period is reliable with earlier investigations that have noticed that the aggregate return–earnings affiliation has turned out to be either inconsequential negative or more positive in the ongoing decades [14, 17].

To find out the solutions for study's questions this paper hypothesizes some hypothesis as follows:

H_1 There is a statistically significant relation between the "change in earnings" achieved by the company and the stock return.

H_2 There is a statistically significant relation between the earning achieved by the company and the stock return.

[1] The traditional model is the change in profit divided by the price at the beginning of the window (EPS/P_{t-1}). The other model, the profit level, is divided by stock prices at the beginning of the window ($\Delta EPS/P_{t-1}$). These models are used to explain the change in stock returns.

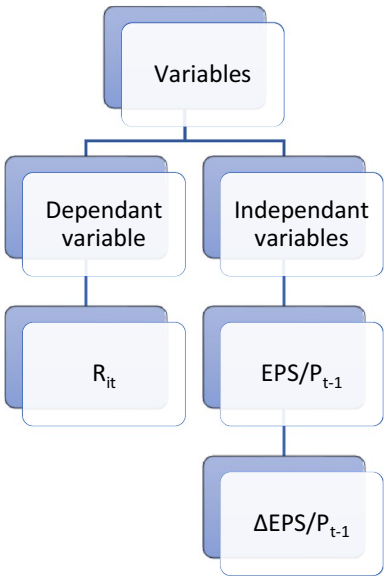

Fig. 1 The main research variables

H_3 The variable earning explains the stock return better than the variable change in earnings.

H_4 There is a statistically significant relationship between both variables the level of earnings and the change in earnings achieved by the company and the stock return.

Data analysis

Research sample

The study population consisted of all shareholding companies in the sectors of industry and services listed in the stock market A shares and from CSMAR database. After dropping the observations containing missing value the study covers the period for 10 years and 21,351 companies. The current study used three basic variables: the stock returns as a dependent variable and the "change in earnings" and the "earning level" as two independent variables as are shown in Fig. 1. In this part of the study, the study models and the main variables used will be reviewed and measured.

Most returns–earnings relationship studies assume that the relationship is linear, so the most commonly used method is the ordinary least-squares regression. The information content of the earnings is usually based on the slope of the model, which is known in the accounting literature as the ERC, and the adjusted *R*-square [9].

The descriptive statistics and correlations analysis

This section presents descriptive statistics and Pearson's correlations of the main variables in the study.

Table 1 Descriptive statistics

Variables	Obs.	Mean	SD	Min	Max
R_{it}	21,351	.366891	.9315731	− .86725	21.52632
EPS/P_{t-1}	21,351	.026085	.1204007	− 5.606327	2.97778
$\Delta EPS/P_{t-1}$	21,351	.0041936	.1507418	− 5.659051	8.81215

R_{it} is the stock return for *i* companies in *t* year, EPS refers to the earning per share, and ΔEPS is the change in the earning per share. The EPS/P_{t-1} refers to earnings level variable, and $\Delta EPS/P_{t-1}$ refers to the change in earnings, P_{t-1} refers to the market price at the beginning of the period of each year, as all sample companies end their fiscal year on 31/12 each year

Table 2 Correlation analysis

Variables	*R*	EPS/P_{t-1}	$\Delta EPS/P_{t-1}$
R_{it}	1.0000		
EPS/P_{t-1}	0.1017	1.0000	
$\Delta EPS/P_{t-1}$	0.0870	0.6238	1.0000

R_{it} is the stock return for *i* companies in *t* year, EPS refers to the earning per share, and ΔEPS is the change in the earning per share. The EPS/P_{t-1} refers to earnings level variable, and $\Delta EPS/P_{t-1}$ refers to the change in earnings, P_{t-1} refers to the market price at the beginning of the period of each year, as all sample companies end their fiscal year on 31/12 each year

Table 1 presents descriptive measures of returns, earnings level and change in earnings. The table shows that the mean annual return of the sample companies during the period 2007–2016 is approximately 37%, while the mean of change in earnings is 0.4%, and the mean of earnings level is 2.6%.

Table 2 shows the results of Pearson's correlation. The correlation coefficients of the earnings with stock returns 10.1%, which is higher than the correlation coefficient of the change in earnings with stock returns 8.7%, are noted from the table. The table also indicates that Pearson's correlation coefficient between the independent variables has reached about 62.4%.

Test results of study hypotheses

The results of univariate models as an explanatory variable

Table 3 presents the results of Model (1) and Model (2), which were implemented annually for all sample companies for each year in panel B and 5 years in panel C (cross-sectional regressions) and also implemented for all years and all companies of the sample in panel A (pooled regression). Model (2) and Model (3) can be practically formulated as follows [12]:

$$R_{it} = \beta_0 + \beta_1(\Delta EPS_{it})/P_{it-1} + e_{it} \quad (1)$$

where the $\Delta EPS/P_{t-1}$ refers to the change in earnings, and P_{t-1} refers to the market price at the beginning of the period of each year. The change in earnings model is designed to test the ability of change in earnings variable

Table 3 Regression results using Models 1[a] and 2[b]

Years	Model (1)					Model (2)				
	Coef.	*t*	*p* value	Adj. R^2	ObS.	Coef.	*t*	*p* value	Adj. R^2	ObS.
Panel A: for all the years of the study										
2007–2016	.5374857	12.76	0.000	0.0075	21,351	.7871743	14.94	0.000	0.0103	21,351
Panel B: for each year of the study										
2007	.8667998	5.20	0.000	0.0174	1469	.8652518	5.19	0.000	0.0174	1469
2008	− .0791556	− 2.35	0.019	0.0029	1573	.2334002	3.80	0.000	0.0085	1573
2009	.1363219	1.77	0.077	0.0013	1651	.5110337	4.16	0.000	0.0098	1651
2010	.4337996	3.29	0.001	0.0056	1741	.6571182	4.32	0.000	0.0101	1741
2011	1.000335	15.78	0.000	0.1069	2074	.9910451	16.32	0.000	0.1135	2074
2012	.0932823	1.36	0.175	0.0004	2353	.5801068	7.85	0.000	0.0251	2353
2013	.2538702	3.00	0.003	0.0032	2517	.4283031	4.39	0.000	0.0072	2517
2014	.1901409	1.97	0.050	0.0011	2505	.3437245	3.43	.001	0.0043	2505
2015	.0490441	0.39	0.695	− 0.0003	2640	.136619	1.08	0.282	0.0001	2640
2016	.2284659	3.13	0.002	0.0031	2828	.5595473	4.16	0.000	0.0057	2828
Panel C: each 5 years of the study										
2007–2011	.7440664	10.68	0.000	0.0131	8508	1.15279	12.29	0.000	0.0173	8508
2012–2016	.0727095	1.49	0.137	0.0001	12,843	.2983219	5.48	0.000	0.0023	12,843

R_{it} is the stock return for *i* companies in *t* year, EPS refers to the earning per share, and ΔEPS is the change in the earning per share. The EPS/P_{t-1} refers to earnings level variable, and ΔEPS/P_{t-1} refers to the change in earnings, P_{t-1} refers to the market price at the beginning of the period of each year, as all sample companies end their fiscal year on 31/12 each year

[a] Changes in earnings

[b] Earnings level

in the interpretation of the stock return, and this model was built on the assumption of [6]:

$$R_{it} = \beta_0 + \beta_1 \mathrm{EPS}_{it}/P_{it-1} + e_{it} \quad (2)$$

where the EPS/P_{t-1} refers to earnings level variable, and P_{t-1} refers to the market price at the beginning of the period of each year. The earnings model is designed to test the ability of variable of earning in the interpretation of the stock return, this model uses the earnings variable to represent the unexpected earnings, and this model was built on the assumption of Ohlson [24].

The implementation of Model (1) aims to test the first hypothesis in the current study (whether there is a statistically significant relation between the "change in earnings" achieved by the company and the stock return). This model represents the traditional model that has been tested in accounting literature since the study of Ball and Brown [1]. This model is referred to the change in earnings. The objective of testing this model is to build a result from the Chinese reality to compare what this paper proposes from another standard with the results of the traditional model. In addition, if the proposed model explains more and less erroneously the stock return compared to the traditional model.

The objective of implementing Model (2) is to test the second hypothesis in the current study (whether there is a statistically significant relation between the earning level achieved by the company and the stock return or not). This model represents the proposed standard which the present study seeks to test for its superiority over the first standard (the traditional model).

The trade-off between the proposed models of the association between earning and the stock returns is usually based on the earning level factor and the explanatory power of the model. The higher the earning response coefficient and the explanatory power, the greater the variable used in the model, the more likely it is to interpret the stock returns. Thus, the method of trade-off between the first and the second choices is based on the comparison between the coefficient of change in earnings and the coefficient of earning, and also on the explanatory power of Model (1) with the explanatory power of Model (2) and will be meaning by adjusted R-square for each model. This trade-off seeks to test the third hypothesis of this study that the earning variable explains the stock return better than the change in earnings variable.

A review of the results of the current study and the phenomenon in Table 3 shows that the coefficient of earning level and coefficient of change in earnings have statistical significance at a confidence level higher than 0.05 in the model implemented for all years and all sample companies. The sample carried out annually for all sample

companies showed that the earning level coefficient was statistically significant at a confidence level higher than 0.05 in 9 years of the 10 years of study (panel B). On the other hand, the coefficient of change in earnings was statistically significant at a confidence level higher than 0.05 in only 4 years of study (2007–2016). The earning level coefficient was not statistically significant in 2015, and also the coefficient of change in earning was not statistically significant at any level of confidence. By comparing the results of the earning level coefficient with the earning-change coefficient in the model implemented for all years and all the sample companies panel A, the earning level coefficient (0.787) is higher than the change in earning (0.537). A test was then carried out in the panel C to ensure that the length of the window of the study period did not affect the results in panels A and B, which showed that the coefficient of earnings level was greater in 2007–2011 that is 1.15279 compared to the change in earnings 0.7440664 and therefore has a greater interpretation for the stock returns, where adjusted R^2 was 0.0173 for earnings level against 0.0131 for change in earnings. The same in the second 5 years in the panel C that is 2012–2016, the coefficient for earnings level was 0.2983219 against the change in earnings coefficient was 0.0727095, and the adjust R^2 for earnings level was greater than the change in earnings adjust R^2, respectively, 0.0023 and 0.0001.

Therefore, it is noted from the results of the models, which include one explanatory variable, which the earning level variable is better than the variable of the earning change in the explanation of the stock returns. The explanatory power[2] of the model for all years and all sample companies using the earning level variable was 1.03%, while the variable change in earning was only 0.75%. By comparing the results of the current study with those of Easton and Harris [12] that were conducted on the US market, they are consistent with the findings of this study. In addition, the explanatory power of the earnings level variable of the model was carried out for all years and all companies in the study [12] which was 7.5%, while the change in earnings was 4%.

This result concludes that there is a strong correlation between the level of earnings and the returns of Chinese companies, and that the use of the change in earnings as a representative of unexpected earnings in the study of the relationship of return on earnings leads to a reduction in the estimate of the importance of earnings in the interpretation of returns. It also concludes from this theoretical and practical result that the traders in the financial market in China assess the earnings of companies as earnings that include temporary or transient items. This is evidenced by the weakness of the relationship between the variable change in earnings and stock returns because of the error of measurement of unexpected earnings when using the change variable in earnings. So, it was expected that the correlation will be strong between the level of earnings and returns of shares of companies, and this has been proven by this study.

The results of multivariate models as explanatory variables

This section presents the results of the fourth hypothesis test, which seeks to test the improvement in the interpretation of the stock return when more than one proxy uses more than one unexpected earning in the earning–return model. The current study uses both the traditional variable (change in earning) and the proposed variable in this study (earnings level) combined to represent the unexpected earnings.

To judge whether the use of more than one proxy of unexpected earnings is better than using either of the other two positions alone, the earning response coefficient (which equals the sum of the earning level coefficient and the coefficient of the change in the earning) will be compared in Model (3). The earnings response in the model used the change in earning Model (1) and the earnings response coefficient in the model using the earning level Model (2). In this aspect we will also address the explanatory power of the multivariate model (Model 3) with the explanatory power of the univariate two models: Model (1) and Model (2).

Table 4 presents the results of multivariate regression for all years and all companies (pooled regression) and for each year for all companies (cross-sectional regressions) resulting from the implementation of the following Model (3) used in the study [12]:

$$R_{it} = \beta_0 + \beta_1 \Delta \mathrm{EPS}_{it}/P_{it-1} + \beta_{2i} \mathrm{EPS}_{it}/P_{it-1} + e_{it} \quad (3)$$

The model assumed by Ohlson [23] can be seen as a comparison of the constant elements with the temporary elements of earning by using both the change in earnings and the level of earnings in the value model of company. When earnings are permanent (temporary), the variable of change in earning (earning) expresses unexpected earnings. But when it includes fixed and temporary elements, the weighted average of both variables is able to express unexpected earnings, so that the weighting depends on the fixed rate of earning. Therefore, the implementation of Model (3) is necessary and complementary to the previous tests, which included one explanatory variable.

Table 4 shows that the earning coefficient for the model implemented for all years and all companies reached

[2] Adjusted R-square is using for this purpose and I compared between earnings variable' R^2 and change in earnings variable' R^2 to know which one can interpret the stock returns more other.

Table 4 Regression results using Model (3)

Years	EPS_{it}/P_{it-1}				$\Delta EPS_{it}/P_{it-1}$				
	Coef.	*t*	*p* value	Obs.	Coef.	*t*	*p* value	Adj. R^2	Obs.
Panel A: for all the years of the study									
2007–2016	.6014348	8.93	0.000	21,351	.2378153	4.42	0.000	0.0112	21,351
Panel B: for each year of the study									
2007	− 5.296317	− 0.51	0.612	1469	6.163003	0.59	0.556	0.0170	1469
2008	1.210652	11.05	0.000	1573	− .6355301	− 10.61	0.000	0.0743	1573
2009	.4917024	3.79	0.000	1651	.0374972	0.46	0.644	0.0093	1651
2010	.5419993	3.11	0.002	1741	.2028269	1.34	0.180	0.0105	1741
2011	.620926	7.22	0.000	2074	.5388049	6.02	0.000	0.1284	2074
2012	.8936394	9.22	0.000	2353	− .4424005	− 4.96	0.000	0.0348	2353
2013	.3998597	3.22	0.001	2517	.0397009	0.037	0.712	0.0069	2517
2014	.3231353	2.83	0.005	2505	.0415005	0.38	0.706	0.0039	2505
2015	.358569	1.44	0.149	2640	− .2542841	− 1.04	0.299	0.0001	2640
2016	.4736128	3.34	0.001	2828	.1478155	1.93	0.054	0.0067	2828
Panel C: for each 5 years of the study									
2007–2011	.8601678	7.26	0.000	8508	.3548667	4.05	0.000	0.0191	8508
2012–2016	.4258049	5.95	0.000	12843	− .1759732	− 2.74	0.006	0.0028	12,843

$R_{it} = \beta_0 + \beta_{1i}EPS_{it}/P_{it-1} + \beta_{2i}\Delta EPS_{it}/P_{it-1} + e_{it}$

R_{it} is the stock return for *i* companies in *t* year, EPS refers to the earning per share, and ΔEPS is the change in the earning per share. The EPS/P_{t-1} refers to earnings level variable, and $\Delta EPS/P_{t-1}$ refers to the change in earnings, P_{t-1} refers to the market price at the beginning of the period of each year, as all sample companies end their fiscal year on 31/12 each year

0.601 and was statistically significant at the 0.001 level. In contrast, the change in earnings coefficient for the model implemented for all years and all companies was 0.238. The earning coefficient for the model carried out annually and for all companies was statistically significant at a level of confidence higher than the coefficient of change in earnings.

The explanatory power of the model implemented for all years and all companies was 1.12%. We note from Table 4 that the ERC[3] of the model implemented for all years and all companies reached 0.839 as compared to 0.787 and 0.537 for the models which include, respectively, the variable earnings level and the change in earnings variable separately in Table 3 at panel (A). This result indicates that earning level variable is more associated with the stock returns than change in earnings variable with the returns. The results also indicate that the use of both variables increases the contribution of accounting earnings to the interpretation of changes in the returns of the shares of companies. The explanatory power of the model that included both variables was (1.17%), which is greater than the result of using one explanatory variable in the model implemented for all years and all companies, whether the variable was the earnings level (1.03%) or the change in earning (0.75%).

Panel C is showing that the 5-year regression confirmed the same result that the ERC for both variables coefficients 1.2150345 was greater in 2007–2011 compared to the results in Table 3. In panel C, the change in earnings 0.0173 and earnings level 1.15279 ensure that using two variables in one model is interpreting the stock return more than each variable in different models.

By comparing the results of this study with Easton and Harris [12], it is clear that the results of this study are consistent with their study, which showed that the earnings level coefficient and the change in earning coefficient in the model carried out for all years and all companies were, respectively, 0.71 and 0.16 and the explanatory power of the model was 8%. Their study also showed that the earnings level coefficient was statistically significant at 0.05 or higher confidence levels in all the years of study, while the coefficient of change in earnings was statistically significant in eight of their 19 years of study.

Further analysis using control variables

In this section, the returns–earnings relationship is re-tested using a set of control variables to verify whether these variables affect the relationship or not. The size of the company may affect the relationship as well as the

[3] The earnings response coefficient (ERC) is the sum of both coefficient of the earning level variables and the change in earnings.

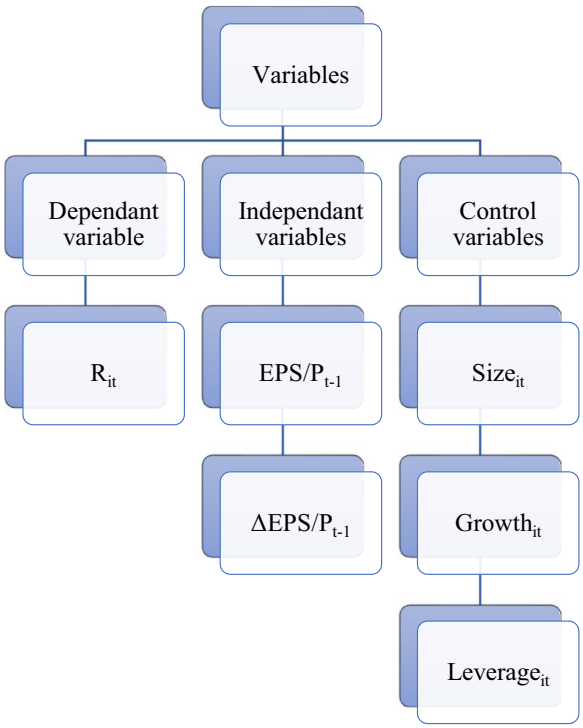

Fig. 2 The further analysis variables

ratio of debt, and the increase in sales may also affect that relationship.

Models design and variables definition

Based on Fig. 2, three models will be tested to find more evidence about my investigations, and Model 4 within three control variables is to regress the change in earnings with stock returns. Model 5 is to analyze the multiple linear regression of the level of earnings and returns using the control variables. Model 6 was used variable change in earnings as well as earning level in addition to control variables.

$$R_{it} = \beta_0 + \beta_1(\mathrm{EPS}_{it})/P_{it-1} + \mathrm{Size}_{it} + \mathrm{Growth}_{it} + \mathrm{Leverage}_{it} + e_{it} \quad (4)$$

$$R_{it} = \beta_0 + \beta_1 \Delta\mathrm{EPS}_{it}/P_{it-1} + \mathrm{Size}_{it} + \mathrm{Growth}_{it} + \mathrm{Leverage}_{it} + e_{it} \quad (5)$$

$$R_{it} = \beta_0 + \beta_{1i}\mathrm{EPS}_{it}/P_{it-1} + \beta_{2i}\Delta\mathrm{EPS}_{it}/P_{it-1} + \mathrm{Size}_{it} + \mathrm{Growth}_{it} + \mathrm{Leverage}_{it} + e_{it} \quad (6)$$

where R_{it} is the stock return for i companies in t year (annual return without cash dividend reinvested), EPS refers to the earning per share (basic earnings per share, and $\Delta\mathrm{EPS}/P_{t-1}$ refers to the change in earnings, and P_{t-1} refers to the market price at the beginning of the period of each year. Size is the logarithm of aggregate assets. Growth was calculated based on (operating revenue)—the revenue recognized by the company except interests' income, net earned premiums, commissions and fees income $(R_t - R_{t-1})/R_{t-1}$. Leverage is ratio of liabilities divided by total assets.

Data analysis

Table 5 reports the descriptive statistics for stock returns, earnings changes and earnings level from 2007 to 2016. The sample is 18,093 after deleting the missing observations. The table shows that the mean annual return of the sample companies during the period 2007–2016 is approximately 40%, while the mean of change in earnings is 0.4%, and the mean of earnings level is 3%. The results are closed to the findings above.

Table 5 Descriptive statistics using control variables

Statistic	*N*	Mean	SD	Min	Pctl(25)	Pctl(75)	Max
R	18,093	0.4	0.9	−0.9	−0.2	0.7	21.5
$\Delta\mathrm{EPS}/P_{t-1}$	18,093	0.004	0.2	−5.7	−0.01	0.01	8.8
EPS/P_{t-1}	18,093	0.03	0.1	−5.6	0.01	0.04	3.0
Leverage	18,093	0.5	1.9	−0.2	0.3	0.6	142.7
Size	18,093	9.5	0.6	4.7	9.1	9.9	12.4
Growth	18,093	77.1	4079.6	0.000	0.3	4.0	395,862.3
EPS	18,093	0.3	0.6	−21.9	0.1	0.5	14.6
ΔEPS	18,093	−0.01	0.6	−20.5	−0.2	0.1	18.9
P_t	18,093	14.4	13.0	0.2	6.9	17.7	334.1
P_{t-1}	18,093	14.9	14.9	0.2	6.4	18.0	249.7

R_{it} is the stock return for *i* companies in *t* year (annual return without cash dividend reinvested), EPS refers to the earning per share, and ΔEPS is the change in the earning per share. The EPS/P_{t-1} refers to earnings level variable, and $\Delta\mathrm{EPS}/P_{t-1}$ refers to the change in earnings, P_{t-1} refers to the market price at the beginning of the period of each year, as all sample companies end their fiscal year on 31/12 each year. Leverage is measured as total liabilities divided by total assets. Size, this measures the company's natural logarithm of total assets at the end of the previous fiscal year. Growth variable natural logarithm operating revenue

Table 6 Correlations analysis using control variables

	R	EPS/P_{t1}	CEPS/P_{t1}	Leverage	Size	Growth
R	1.0000					
EPS/P_{t-1}	0.0999	1.0000				
ΔEPS/P_{t-1}	0.0843	0.6248	1.0000			
Leverage	0.0126	0.0161	0.0773	1.0000		
Size	− 0.1005	0.1187	− 0.0106	− 0.0913	1.0000	
Growth	− 0.0082	0.0311	0.0345	0.3087	− 0.0721	1.0000

R_{it} is the stock return for *i* companies in *t* year (annual return without cash dividend reinvested), EPS refers to the earning per share, and ΔEPS is the change in the earning per share. The EPS/P_{t-1} refers to earnings level variable, and ΔEPS/P_{t-1} refers to the change in earnings, P_{t-1} refers to the market price at the beginning of the period of each year, as all sample companies end their fiscal year on 31/12 each year. Leverage is measured as total liabilities divided by total assets. Size, this measures the company's natural logarithm of total assets at the end of the previous fiscal year. Growth variable natural logarithm operating revenue

Table 6 shows the results of Pearson's correlation. The correlation coefficients of the earnings with stock returns 9.9%, which is higher than the correlation coefficient of the change in earnings with stock returns 8.4%, are noted from the table. Based on these results, we found out that the relationship did not affect by using control variables.

Regression results using control variables

Accounting factors are principally chronicled, as in accounting estimation strategies for the most part reflect past exchanges and occasions. In accounting speech, income are "perceived" just when the earning procedure has been finished, which implies that accounting earnings for the most part are estimated precisely when products or services are conveyed to clients. Since data about anticipated that exchanges winds up accessible would financial specialists previously the purpose of accounting estimation, earnings development is to a degree unsurprising, and desires for future earnings development are reflected in current stock prices. This is the situation at both the firm level and, significantly more thus, the aggregate level. In this manner, accounting earnings are for the most part seen as being unsurprising, yet not as indicators of future speculation or future development. However, accounting variables can be key indicators of some aspects of economic activity because they reflect the real events in companies and their product markets and factors. One clear mechanism is that earnings reflect the return on investment, which can be beneficial to the profitability of new investments (both for the company itself and its competitors, suppliers and companies in general), depending on the degree of consistency over time in the return on asset.

In Table 7 we note that the coefficient of earning level in Model 4 is greater than the coefficient in Model 5. This explains the ability of the earning level to interpret the returns using the earning level model using the control variables. Consequently, the results are consistent with what was previously tested for Models 1 and 2. While the results are quite different when comparing the results of Model 3 with Model 6, which used the variable of change in earnings and earning level variable, taking into account the control variables, the results indicate that the ERC in Model 6 (0.984) is higher than the coefficient of change in earnings in Model 5 and is equal to the earning level coefficient in Model 4. This means that the control variables did not affect the returns–earnings relationship to earnings. The results of this study are consistent with what is stated in the accounting literature, whether theoretical or practical. When more than one representative was used for the unanticipated earnings in the earning–earnings model, this result indicates that the earning level variable is related to the returns of the companies' shares rather than the variable change in earnings with the returns of the companies' shares. The results also indicate that the use of both variables increases the contribution of accounting earnings in the interpretation of changes in the returns of shares of companies.

Implication of the study

This study tests the relationship between returns and earnings. In particular, the study presents an applied test aimed at determining whether the earnings level variable divided by the market price per share at the beginning of the study window is appropriate to evaluate the return–earnings relationship between returns and earnings, compared to the variable of earnings change divided by the market price per share at the beginning of the study window. The study found that the earnings level variable is more suitable for interpreting the change in equity returns than in the case of the traditional variable used in accounting research for the earning–return relationship, which is defined as the change in earnings. The study also found that the use of both variables leads to an improvement in the earning response coefficient and the explanatory power of the earning–return relationship model.

This finding concludes that there is a strong correlation between the level of earnings and the returns of Chinese

Table 7 Regression results using control variables

	Dependent variable		
	Model (4)	**Model (5)**	**Model (6)**
EPS/P_{t-1}	0.984***		0.990***
	(0.064)		(0.088)
$\Delta EPS/P_{t-1}$		0.470***	− 0.006
		(0.044)	(0.061)
Size	− 0.587***	− 0.571***	− 0.587***
	(0.026)	(0.026)	(0.026)
Leverage	− 0.007*	− 0.009**	− 0.007*
	(0.004)	(0.004)	(0.004)
Growth	− 0.00001***	− 0.00001***	− 0.00001***
	(0.00000)	(0.00000)	(0.00000)
Observations	20,993	20,993	20,993
R^2	0.039	0.032	0.039
Adjusted R^2	− 0.115	− 0.123	− 0.115
F statistic	183.071*** (*df* = 4; 18,089)	150.567*** (*df* = 4; 18,089)	146.450*** (*df* = 5; 18,088)

This panel shows the regression results of regression results using control variables. The dependent variables are returns. The EPS/P_{t-1} refers to earnings level variable, and $\Delta EPS/P_{t-1}$ refers to the change in earnings, P_{t-1} refers to the market price at the beginning of the period of each year, as all sample companies end their fiscal year on 31/12 each year. Leverage is measured as total liabilities divided by total assets. Size, this measures the company's natural logarithm of total assets at the end of the previous fiscal year. Growth variable natural logarithm operating revenue. Standard errors in parentheses

***$p < 0.01$; **$p < 0.05$; *$p < 0.1$

companies and that the use of change in earning as an unanticipated earnings representative in the study of the return–earnings relationship leads to a reduction in the importance of earnings in the interpretation of returns. As a result of this theoretical and practical result, China's financial market traders assess corporate earnings as earnings that include temporary or temporary items. This is reflected in the weak correlation between the changing variability in earnings and equity returns because of the error of measuring unanticipated earnings when using a change in earning variable. Therefore, it was expected that the correlation between earnings level and corporate earnings would be strong, as demonstrated by this study.

In light of the results of the study, the researcher recommends using the two variables together when studying the information content of the earnings or when examining the additional information content of the other accounting variables compared to the earnings or the increase in earnings. The researchers also confirm that this study represents one of the methods of improving the measurement of the relationship of return on earnings, and it is possible for interested researchers to try to study the effect of splitting the number of earnings to its components to determine whether it has a content of greater than the number of single earnings. There is a strong correlation between the level of earnings and the returns of shares of Chinese companies, and that the use of the change in earnings as a representative of unexpected earnings in the study of the relationship of return on earnings reduces the estimate of the importance of earnings in the interpretation of returns. Moreover, this finding concluded that in theory and in practice, China's financial market operators value corporate earnings as temporary or transient items. This is evidenced by the weak correlation between the variable change in earnings and the return of shares due to the error of measurement of unexpected earnings when using the change variable in earnings. If this is the case, it is expected that the correlation will be strong between the level of earnings and the returns of shares of companies, which proved this study.

Conclusions

This paper includes three aspects. First of all, in the choice of empirical methods, the literature found mostly uses linear simple regression method. The empirical study was carried out according to simple and multiple regression models to compare any models more effective. Based on previous research, this paper uses the recent equation that contains the earnings vector in the interpretation of the structural stock returns variable to perform the empirical analysis. The effect of traditional model (change in earnings) was low than earnings model. But when we carried out the results using the variables in one model were better than using one variable whether it is earning or change in earning, thus this will help to avoiding the problem effectively. Second, most of the literature in the study of the relationship between earnings

and returns has been largely based on the change in earnings, which reduces the appreciation of the importance of earnings in the interpretation of returns. It is also possible to conclude that traders in the financial market assess the earnings of companies as earnings that include temporary or transient items. This is evidenced by the weakness of the relationship between the variable change in earnings and returns because of the error measurement of the unexpected earnings when using the variable change in earnings and if so, it is expected that the correlation will be strong between the level of earnings and the stock returns, and this is proved by this study. Third, some control variables were selected and introduced on the mentioned models which have an effect on earnings and returns and results showed that there is no effect on final results compared with those in the main analysis without control variables.

The current study investigates the earnings–returns relationship. Specifically, the study presents an empirical study aimed to determine whether the variable earnings level divided by the stock price per share at the beginning of the study window is appropriate to assess the relationship between returns and earnings, compared to the variable change in earnings divided by the market price per share at the beginning of the study window. The study found out that the earnings level variable is more suitable for interpreting the change in stock returns than in the traditional variable used in accounting research for the earnings–return relationship, which is defined as the change in earnings. The study also concluded that the use of both variables leads to an improvement in the earnings response coefficient and explanatory power of the earnings–return relationship model. The results of this study are in line with what is stated in accounting literature, both theoretical and practical as presented in discussion section.

We found out the earnings are positively correlated with the return in the previous period. This means that the results of the current study consisted with those of Easton and Harris [12] that were conducted on the US market, the model carried out for all years and all companies results that the explanatory power of the earning level variable was 7.5%, while the change in earning was 4%. Then we tested the relationship between earnings and change in earnings with the stock returns and found that the use of a model contains two explanatory variables to increase the explanation of stock returns, it is clear that the results of this study are consistent with [12], and their study showed that the earning level coefficient and the change in earning coefficient for the model carried out for all years and all companies were, respectively, 0.71 and 0.16, and the explanatory power of the model was 8%.

Abbreviations

CSMAR: China Stock Market & Accounting Research Database; CSRC: China Securities Regulatory Commission; ERC: earnings response coefficients; EPS: earnings per share; ΔEPS: changing in earnings per share; *P*: market price.

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Authors' contributions

The author analyzed and interpreted the data. He performed the statistical testing and was the contributor in writing the manuscript. The author read and approved the final manuscript

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Availability of data and materials

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Not applicable.

Consent for publication

Not applicable.

Competing interests

The author declares that he has no competing interests.

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