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**Article**

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Global Business & Finance Review (GBFR)

**Provided in Cooperation with:**

People & Global Business Association (P&GBA), Seoul

*Suggested Citation:* Anh Do Nguyet (2017) : The impact of earnings volatility on earnings predictability, Global Business & Finance Review (GBFR), ISSN 2384-1648, People & Global Business Association (P&GBA), Seoul, Vol. 22, Iss. 2, pp. 82-89, <https://doi.org/10.17549/gbfr.2017.22.2.82>

This Version is available at:

<https://hdl.handle.net/10419/224372>

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## The Impact of Earnings Volatility on Earnings Predictability

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### ABSTRACT

This paper is aim to investigate the influence of earnings volatility on earnings predictability. In particular, by using sample of non-financial Vietnam listed companies on the Ho Chi Minh stock exchange from 2010 to 2014, we find the evidence to confirm the inverse relation between earnings volatility as well as earnings predictability in both short term and long term duration. Moreover, based on regression models estimated for earnings volatility quintiles, for the high profitable company, if it has the low volatility of earnings, the predictability of earnings is higher than those has the high volatility. Thus, in this case, the extent of earnings volatility can be successful to predict the future earnings.

*Keywords: earnings volatility, earnings persistence, earnings predictability, earnings management.*

### 1. Introduction

The information related to the firm's business performance is one of the interests of many outside users. In fact, a firm always faces to face many uncertain situations in modern business environment. This situation can have an influence on the changes of reported earnings which decreases the ability of earnings to predict future earnings. This study is conducted to examine the links between earnings volatility and earnings predictability in listed companies on the Ho Chi Minh stock exchange from 2010 to 2014.

There are some motivations for this study. Firstly,

in the financial area, there are various applications which require the prediction of earnings such as an equity valuation topic while our knowledge about the long-run forecast of earnings is limited. Moreover, most of prior research that examine the significance of earnings volatility for a firm's value have paid attention to the influence of earnings volatility on the cost of capital. The results show that earnings volatility can make the firm's value decrease by boost the cost of capital (Beaver, Kettler, & Scholes, 1970; Francis, LaFond, Olsson, & Schipper, 2004; Minton, Schrand, & Walther, 2002). Besides, the survey of (Graham, Harvey, & Rajgopal, 2005) points out the evidence related to the belief of nearly 80% of managers which is volatility of earnings reduces earnings predictability. After this survey, there are many studies to test the validity of this ideal (Dichev & Tang, 2009; Frankel & Litov, 2009; Petrovic, Manson, & Coakley, 2009; Yosra & Fawzia, 2015).

Received: Apr 30, 2016; Revised: Sep 21, 2016; Accepted: Jan 19, 2017

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Dichev & Tang (2009) are the first researchers who indicate the negative relationship between earnings volatility and earnings predictability and try to explain the nature of earnings volatility. On the other hand, the study of (Petrovic et al., 2009) examines the concern whether earnings volatility is helpful to predict the next level of earnings and gives the conclusion that this link is negative.

In our study, we further to investigate the relation between earnings volatility as well as short-term and long-term predictability by using the data of listed firms on Ho Chi Minh Stock Exchange. We also use the causal theory to explain the results related to the correlations between volatility and earnings predictability.

Our finding supports all the predictions. The first finding is that earnings volatility is strongly inversely related to earnings persistence and earnings predictability in both a short and long horizon. Furthermore, when current earnings are high, the firms with the low level of earnings volatility will have the higher the predictability of earnings. Overinvestment is an important element in explaining this relationship.

The rest of paper is organized as follow. The next part presents some discussions related previous research and develops hypothesis. Section 3 provides the main empirical test included sample selection, research design and results. Some main conclusions and ideas for future research are given as the last part.

## II. Prior related research and predictions

Earnings predictability refers to the ability of earnings to predict itself (Lipe, 1990). There are different applications of accounting data require the prediction of earnings such as valuation research and practice representatively use projections of earnings to derive estimates of company and equity value. Analysts always try to applied new methods to improve on their earnings forecasts. On the other hand, investors are more tend to identify biases in

analysts' forecasts as well as enhance the accurate level of current forecasts. As the results, the needed of predictability of earnings in both short-term and long term cannot be denied.

Turning into earnings volatility, according to (Dichev & Tang, 2009), it is not only the consequences of economic shocks but also of problems in the accounting determination of income. In fact, business environment contains many risks which are uncertain and not avoidable, thus it leads to operating results of corporations become more volatile and less predictable. Moreover, the poor matching of expenses and revenue in (Dichev & Tang, 2007) and the quality of accruals influence in (Dechow & Dichev, 2002) are two main features of the determination of earnings which illustrate an accounting association between earnings volatility and earnings predictability. Besides, (Graham et al., 2005) argue that managers prefer smooth earnings because they believe that it will make the forecasts of the future firm performance easier.

The study of Dichev & Tang (2009) provides the commonly used auto regressive regressions of current on one-year lagged earnings to examine the relation between earnings volatility and earnings predictability.

$$E_t = \alpha + \beta E_{t-1} + \varepsilon \quad (1)$$

Taking the variance of both sides yields

$$\text{Var}(E_t) = \beta^2 \text{Var}(E_{t-1}) + \text{Var}(\varepsilon) \quad (2)$$

Assuming that the variance of earnings is stationary over time, we have

$$\text{Var}(\varepsilon) = \text{Var}(E) (1 - \beta^2) \quad (3)$$

In model 3,  $\text{Var}(E)$  is proxy of earnings volatility while  $\text{Var}(\varepsilon)$  is the variance of earnings remaining affect having taken into account the effect of the autoregressive coefficient  $\beta$ , which is cited as earnings persistence. In other way, variance of error term is an (inverse) proxy of earnings predictability.

Equation 3 can be seen as the useful guide to

mechanism of the link between earnings volatility and earnings predictability. Firstly, if earnings persistence ( $\beta$ ) is unchanged, there is an inverse correlation between earnings volatility and earnings predictability. In addition, because of the influence of persistence coefficient, this negative relation is emphasized strongly.

Note that the notion of predictability capture in  $\text{Var}(\varepsilon)$  is “absolute” predictability, unadjusted for volatility in the earnings environment. If one is interested in “relative” predictability, a natural scalar for  $\text{Var}(\varepsilon)$  is  $\text{Var}(E)$

$$1 - \frac{\text{Var}(\varepsilon)}{\text{Var}(E)} = \beta^2 \quad (4)$$

$$\beta^2 = R^2 \quad (5)$$

Equation (4) shows that relative predictability is the  $R^2$  of the regression (1) which is equal to the square persistence coefficient. Thus the analysis of the effect of volatility on earnings persistence is a key to our investigation of earnings predictability. The empirical objective of this study is twofold. First, we examine the negative relation between earnings volatility and earnings persistence. Secondly, we examine whether and how the use of earnings volatility information leads to appreciable gains in earnings predictability.

Some previous studies have presented the impact of volatility on future earnings. (Minton et al., 2002) find the evidence to support for the idea that current earnings (cash flow) volatility is inversely related to future earnings (cash flow) and it is similar to underinvestment theory. Because of the market imperfections, there is a wedge between the costs of internal and external funds. In reality, managers of a firm make investment decisions based on the source of funding. Thus, high volatility will lead to the increasing of not only the cost of external funds but also internal cash flow shortfalls. For example, the study of (Lamont, 1997) present the evidence that oil companies significantly decrease their non-oil investments compared with the median industry investment when oil price reduce in 1986.

(Minton & Schrand, 1999) also point out that there is a negative correlation between cash flow volatility and investments in fixed assets, research and development and advertising.

The study conducted by (Dichev & Tang, 2009) reports the evidence that earnings volatility is inversely related to earnings persistence as well as earnings predictability. These researchers divide the full sample into five quintiles and show that the persistence coefficient decreases from 0.93 in the low quintile to 0.51 in the high one. Furthermore, low earnings volatility has much higher predictability than high earnings volatility, respectively 0.7 and 0.3.

After a study of Dichev and Tang (2009), there are a numerous of research that have a similar line. (Frankel & Litov, 2009) revisits the finding of Dichev and Tang (2009) by allowing for some theoretically motivated factors such as firm size, earnings growth and so on. Their results are that the predictive power of the past earnings volatility is still strong to the additional controls and the investors are fully understand the effects of earnings volatility.

In the line of this topic, (Hamzavi & Aflatooni, 2011) pay attention on the effect of the income smoothing behavior, which is inverse proxy of earnings volatility, on earnings persistence and earnings predictability. Running the similar empirical test, these researchers support for the idea that earnings predictability and earnings persistence of smoothers is higher than that of other companies. Moreover, the study of (Cao & Narayanamoorthy, 2012) revisits a negative relation between earnings volatility and earnings persistence by using the quarterly earnings sample. Because of the different time-series characteristics of quarterly earnings than that of annual earnings, researchers use the Foster model to carry out their test. Their evidence shows that there is a change in the persistence coefficient of quarterly earnings from 0.425 in the bottom volatility quintile to 0.319 in the top quintile.

Furthermore, (Khodadadi, Tamjidi, Fazeli, Hushmandi, & Nikbakht, 2012) pay an attention to do a research related to the extent of earnings predictability and the volatility of earnings components, which are cash

flow and accruals. They report that the volatility in earnings is more important in the relation to earnings predictability, than either cash flows volatility or accruals volatility. Their result also emphasizes the differentiating power of a negative correlation between earnings predictability and earnings volatility in the five -year horizon of prediction.

Besides, the study of (Petrovic et al., 2009) which is relevant to our study investigates the relationship between ex-ante volatility and future firm performance. Their empirical results indicate that ex-ante volatility is inversely related to future expected earnings and this link is stronger for the highest earnings firms. The negative relation between earnings volatility and future earnings can be explained by the underinvestment and overinvestment story. This phenomenon revolves around market imperfections (agency costs as well as information asymmetry) and behavioral explanations. Because of information asymmetry between managers as well as capital markets, the external financing of new investments is costly than internal financing (Myers & Majluf, 1984; Stiglitz & Weiss, 1981). As the consequences, companies often forego profitable investment opportunities, that is, underinvest, when coped with a shortage of internal funds. On the other hand, overinvestment happens if there is a difference of interests between shareholders and managers. Managers of firm may be tried to spend free cash in excess of profitable investments in 'empire-building' projects (Jensen, 1986; Stulz, 1990). Earnings volatility makes the increase of the likelihood of very low and very high future cash realizations. Because a shortage of fund and excess liquidity are costly, an increase in volatility exacerbates underinvestment (Kenneth, Scharfstein, & Stein, 1993) and overinvestment (Morellec, 2004). If we hold all other elements constant, firms which forego investment will have lower future profitability than firms that invest optimally. Similarly, firms which overinvest will have lower future profitability and cash flows relative to current profitability. Because earnings volatility enhances the investment distortions, we predict that earnings volatility reduces future profitability for high

levels of earnings.

To sum up, we have two hypotheses, which are

**Hypothesis 1:** There is a negative relations between earnings volatility and earnings predictability in short-time and long-time horizon.

**Hypothesis 2:** Among the high profitable firms, if they have the low volatility of earnings, their predictability of earnings is higher than those have the high volatility.

### III. Main empirical test

#### A. Sample selection, descriptive statistics

To examine our hypothesis question, we use data related to publicly- traded Vietnam companies listed in Ho Chi Minh Stock Exchange from 2010 to 2014. We choose Ho Chi Minh Stock Exchange because it is the first stock market in Vietnam with many large-scale listed firms and its trading volumes as well as market capitalization are great. With an original sample, firstly, we delete firms belonged to a financial industry because these firms have special features of finance.

In this case, the sample is restricted to firm- years with complete data for earnings, cash flow from operations and assets from 2010 to 2014. We use earnings (E), which is defined as the annual profit after corporate income tax. Accruals are calculated by taking the different between earnings and cash flow from operation. After that, earnings (E), accruals and cash flow from operation are scaled by the average of total assets.

Next, earnings volatility is measured by taking the standard deviation of the deflator earnings for the most recent five years. Cash flow volatility is also calculated by taking the standard deviation of the deflated cash flow for the most recent five years. Furthermore, in order to ensure a normal distribution, we exclude numerous outliers, which are out 1% and 99% level. Finally, we have 1.265 observations with adequate data.

**Table 1.** Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
E	1,265	-0.390	0.952	0.070	0.088
Accruals	1,265	-0.902	1.136	0.021	0.141
/Accruals/	1,265	0.000	1.136	0.098	0.104
CFOs	1,265	-1.125	0.633	0.049	0.147
Vol( E)	1,265	0.002	0.406	0.044	0.040
Vol(CFOs)	1,265	0.014	0.628	0.104	0.078

**Notes:** *E* is defined as the annual profit after corporate income tax deflated by average total assets. *CFOs* is defined as the cash flow from operating activities deflated by average total assets. *Accruals* is calculated as the difference between *E* and *CFOs*. */Accruals/* is the absolute amount of *Accruals*. *Vol( E)* is defined as the firm-specific volatility of earnings, which is calculated as the standard deviation of *E* over the most recent 5 years. *Vol( CFOs)* is defined as the firm-specific volatility of cash flows from operations, which is calculated as the standard deviation of *CFOs* over the most recent 5 years.

In order to measure earnings persistence and predictability of earnings, we use the wider measurement of various studies such as (Dichev & Tang, 2009; Frankel & Litov, 2009; Hamzavi & Aflatooni, 2011; Khodadadi et al., 2012; Petrovic et al., 2009). In particular, earnings persistence is calculated through the coefficient of autoregressive regression of current on one lagged earnings. Earnings predictability is presented as the  $R^2$  of this regression.

Table 1 below describes descriptive statistics for all needed variables, which are earnings, accruals, cash flow from operating. First of all, a period between 2010 and 2014, earnings is typical higher than cash flow from operation, respectively mean of 7% vs 4.9% and accruals are positive. Also, firm-specific volatility of scaled earnings has a mean of 4.4% and a small standard deviation of 4%, indicating small difference in earnings volatility across companies.

## B. Results for one-year predictive horizons

Table 2 shows the persistence coefficients and  $R^2$  of regressions of one-year ahead earnings on current earnings. As discussed above, these results provide evidence about the economic and statistical significance of the hypothesized negative correlation between earnings volatility and earnings persistence. Overall for the full sample data from 2010 to 2014, a persistence coefficient of earnings is 0.695 and adjusted  $R^2$  is 48.4%.

**Table 2.** Results for earnings persistence regression for the full sample

$E_{t+1} = \alpha + \beta E_t + \epsilon$		
	$\beta$ ( persistence)	Adj. $R^2$
Full sample	0.695***	0.484

**Notes:** *E* is defined as the annual profit after corporate income tax deflated by average total assets.  $E_t$  is current year *E*.  $E_{t+1}$  is the one-year ahead *E*. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Turning into the impact of earnings volatility on earnings predictability, we divided a sample into two groups according to the level of their earnings volatility, which are a high volatility quintile and a low volatility quintile. For each group, we run the regression of one-year ahead earnings on current earnings. Table 3 illustrates the persistence coefficient and the  $R^2$  of regressions by the earnings volatility quintiles.

**Table 3.** Results for earnings persistence regression

$E_{t+1} = \alpha + \beta E_t + \epsilon$		
Quintiles by Vol( E)	$\beta$ ( persistence)	Adj. $R^2$
Group 1: low	0.904***	0.820
Group 2: high	0.630***	0.391
Difference	0.275	0.429
p- Value on Difference	<0.001	<0.001

**Notes:** *E* is defined as the annual profit after corporate income tax deflated by average total assets.  $E_t$  is current year *E*.  $E_{t+1}$  is the one-year ahead *E*. *Vol( E)* is defined as the firm-specific volatility of earnings, which is calculated as the standard deviation of *E* over the most recent 5 years. The p-value for the difference in persistence coefficients across groups is derived from a t-test. The p-value for the difference in the Adjusted  $R^2$  across quintiles is derived from a bootstrapped test. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

As can be seen from table 3, the persistence

decreases from 0.904 in group 1 (low volatility of earnings) to 0.63 in group 2 (the high volatility of earnings), while the adjusted  $R^2$  declines from 82% to 39.1% respectively. These reductions seem large in absolute magnitude and suggest that conditioning on earnings volatility is economically significant.

Besides, table 3 present the results of tests of statistical significance of the difference in persistence coefficient and adjusted  $R^2$  between two groups. In order to do a test for the difference in persistence, observations of two groups are combined and we run the following regression (6)

$$E_{t+1} = \alpha + \beta_1 \text{Dummy}_t + \beta_2 E_t + \beta_3 * \text{Dummy}_t * E_t + \varepsilon \quad (6)$$

In regression (6),  $\text{Dummy}_t$  is a dummy variable, which is coded as 1 if a firm-year belongs to group 1 and 0 if a firm-year belongs to group 2. If the coefficient on interaction variable ( $\beta_3$ ) is statically significant, the difference in persistence coefficients between two groups is considered statistically significant.

In addition, testing for the difference in  $R^2$  is a bootstrap test based on a simulation of the empirical distribution of the test statistic, assuming the null is true. In particular, the null hypothesis is that earnings volatility is unrelated to earnings predictability (adjusted  $R^2$ ) and the test statistic is the difference in adjusted  $R^2$  between two groups. We randomly split the full sample in to pseudo- earnings volatility

groups. Then we run the regression of one-year ahead earnings on current earnings within pseudo group 1 and 2, and obtain a difference in  $R^2$  between two quintiles. This difference is one observation from the simulated distribution under the null. After that, this procedure is repeated 1,000 times, yielding a 1,000 observation empirical distribution of adjusted  $R^2$ . The formal statistical test is based on comparison of the actual observed difference in adjusted  $R^2$  against the simulated distribution of differences. For table 3, the results show that the difference of not only persistence coefficient but also adjusted  $R^2$  is highly significant. Thus, while earnings volatility increases across groups, persistence coefficient and adjusted  $R^2$  significantly decrease. In this case, it is concluded that there is an inversed relation between earnings volatility and earnings predictability as well as earnings persistence. Our finding is consistent with the empirical finding for annual earnings with (Dichev & Tang, 2009; Frankel & Litov, 2009; Hamzavi & Aflatooni, 2011; Khodadadi et al., 2012)

The next objective of this study is to test the ability of earnings volatility to successfully predict future earnings predictability for the more profitable firms.

Table 4 shows the evidence that if current earnings are low, the earnings persistence raises insignificantly when earnings volatility increases across the quintiles. However, for the higher profitable firms, if they have the low volatility of earnings, the predictability of earnings is higher than those has the high volatility, adjusted  $R^2$  decreases from 84% to 35.1%. There

**Table 4.** regressions results by earnings volatility quintiles conditional on current earnings quintiles

		Quintiles by Vol (E)		
		Group 2: high	Group 1: low	Difference (Group 1- group 2)
Quintiles by Earnings	Group 2: high			
	$\beta$	0.574***	0.955***	0.381***
	Adj. $R^2$	0.351	0.840	0.489***
	Group 1: low			
	$\beta$	.955***	.622***	-0.333
	Adj. $R^2$	.229	.465	0.236

Notes:  $E$  is defined as the annual profit after corporate income tax deflated by average total assets.  $E_t$  is the current year  $E$ .  $E_{t+1}$  is the one-year ahead  $E$ .  $Vol(E)$  is defined as the firm-specific volatility of earnings, which is calculated as the standard deviation of  $E$  over the most recent 5 years. The p-value for the difference in persistence coefficients across groups is derived from a t-test. The p-value for the difference in the Adjusted  $R^2$  across quintiles is derived from a bootstrapped test. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

by, volatility is a strong negative predictor of earnings persistence and earnings predictability for high profitable firms. Our results are consistent with the behavioral explanation of overinvestment.

### C. Results for five-year predictive horizons

Table 5 reports results for five-year ahead prediction of earnings, unconditional on earnings volatility. The evidence reveals that the predictive power of earnings quickly deteriorates for longer predictions horizons. The persistence coefficient on earnings reduces from 0.695 in year t+1 to 0.385 in year t+4 and adjusted  $R^2$  also drops from 48.4% in year t+1 to 19% in year t+4.

**Table 5.** The implications of earnings volatility for long-term earnings - Regression results for the full sample

	$\beta$	Adj. $R^2$	Number of observations
$E_{t+1} = \alpha + \beta E_t + \varepsilon$	0.695***	0.484	1,265
$E_{t+2} = \alpha + \beta E_t + \varepsilon$	0.530***	0.324	1,012
$E_{t+3} = \alpha + \beta E_t + \varepsilon$	0.436***	0.230	759
$E_{t+4} = \alpha + \beta E_t + \varepsilon$	0.385***	0.190	506
$E_{t+5} = \alpha + \beta E_t + \varepsilon$	0.465***	0.208	253

**Notes:**  $E$  is defined as the annual profit after corporate income tax deflated by average total assets.  $E_t$  is the current year  $E$ .  $E_{t+1}$  is the one-year ahead  $E$ .  $E_{t+2}$  is the two-year ahead  $E$ .  $E_{t+3}$  is the three-year ahead  $E$ .  $E_{t+4}$  is the four-year ahead  $E$ .  $E_{t+5}$  is the five-year ahead  $E$ . \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Next, table 6 presents the results related to the influence of earnings volatility on earnings predictability in a long horizon. The evidence indicates dramatic differences in the long-run predictive characteristics of the underlying samples, which are firm-years in the high quintile of earnings volatility and that in the low quintile of earnings volatility. In particular, for the companies belonged to the high earnings volatility group, there is a quick deterioration of persistence (0.63 to 0.422) and adjusted  $R^2$  (0.391 to 0.158) over five-year predictive period. However, the results of group 1, which includes firms with the low earnings volatility, disclose a robust predictive power over the entire five-year horizon. The persistence

coefficient and adjusted  $R^2$  are high in year t+1, 0.904 and 82% respectively, while in year t+5, they are 0.693 and 46.1%. Thus, these figures imply that it is easier to predict earnings five year ahead for low volatility firms than to predict one year ahead earnings for high volatility companies. It is concluded that earnings volatility has an obviously differentiating power in the long horizon prediction of earnings.

**Table 6.** The implications of earnings volatility for long-term earnings - Regression results by quintiles of earnings volatility

	Quintiles by Vol (E)			
	Group 1: Low		Group 2: high	
	$\beta$	Adj. $R^2$	$\beta$	Adj. $R^2$
$E_{t+1} = \alpha + \beta E_t + \varepsilon$	0.904***	0.820	0.630***	0.391
$E_{t+2} = \alpha + \beta E_t + \varepsilon$	0.861***	0.716	0.444***	0.233
$E_{t+3} = \alpha + \beta E_t + \varepsilon$	0.832***	0.645	0.353***	0.155
$E_{t+4} = \alpha + \beta E_t + \varepsilon$	0.809***	0.587	0.312***	0.128
$E_{t+5} = \alpha + \beta E_t + \varepsilon$	0.693***	0.461	0.422***	0.158

**Notes:**  $E$  is defined as the annual profit after corporate income tax deflated by average total assets.  $Vol(E)$  is defined as the firm-specific volatility of earnings, which is calculated as the standard deviation of  $E$  over the most recent 5 years.  $E_t$  is the current year  $E$ .  $E_{t+1}$  is the one-year ahead  $E$ .  $E_{t+2}$  is the two-year ahead  $E$ .  $E_{t+3}$  is the three-year ahead  $E$ .  $E_{t+4}$  is the four-year ahead  $E$ .  $E_{t+5}$  is the five-year ahead  $E$ . \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

## IV. Conclusions

This study aims to investigate the impact of earnings volatility on earnings predictability by using the sample of Vietnam listed firms on Ho Chi Minh Stock exchange from 2010 to 2014. In general, we find that earnings volatility provides reliable discrimination on relative earnings persistence and predictability in both the short-time and long-time horizon. Furthermore, the empirical results reveal that among firms with high profit, if it has the low volatility of earnings, the predictability of earnings is higher than those has the high volatility. These findings are most consistent with overinvestment and persistence explanations.

Our findings open several of possibilities for future



research. It is suggested that the researchers can use other samples and variable calculations such as the volatility of earnings and so on. One another potential direction is that the extent to which the implication of volatility is priced in stock returns.

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