



Earnings Volatility and Earnings Predictability

Ben Mhamed Yosra, University of Tunis El Manar
Jilani Fawzi, University of Tunis El Manar

Abstract

This paper examines the relation between earnings volatility and earnings predictability. In particular, using a sample of Canadian firms during the period 2006-2011, we conduct two sets of tests. First, we examine the effect of volatility on earnings persistence and earnings predictability. Second, we test whether volatility-future earnings varies with the level of current profitability. The findings confirm the evidence of an inverse volatility-earnings predictability relation. Furthermore, this paper presents empirical evidence of the ability of earnings volatility to successfully predict future earnings only for the most profitable firms. Our results are consistent with the behavioral explanations of overinvestment and earnings persistence. This article highlights the contribution of earnings volatility towards forecasting future earnings.

Keywords: Earnings volatility, Earnings predictability, Earnings persistence, Current profitability.

JEL Classification: G17, M41

Introduction

The recent context of uncertainty which the firm faces is one of the most important changes in the financial and accounting field. This situation can have an impact on the variability of reported earnings which reduces the ability of current earnings to predict future earnings. Thus, volatility affects on the empirical projection of future earnings to derive estimates of firm and equity value, which we are going to analyze. This study examines whether past earnings volatility has incremental explanatory power for the earnings predictability.

Most previous research that investigates the importance of earnings volatility for a firm's value has focused on the effects of earnings volatility on the cost of capital. Many study illustrate that earnings volatility can reduce the firm's value by enhancing the cost of capital¹. However a few recent studies directly examine the relation between earnings volatility and subsequent earnings levels. Graham et al (2005) provide important evidence that 80% of managers believe that past earnings volatility reduces earnings predictability. The validity of this belief has been tested by a some recent studies (Dichev et Tang, 2009 ; Frankel et Litov, 2009 ;Petrovic et al, 2009 ; Hamzavi et Aflatooni, 2011 ; khodadadi et al, 2012 ; Cao et Narayanamoorthy, 2012). To my knowledge Dichev et Tang (2009) is the first study that directly investigates this link, and reports a negative relation between earnings volatility and earnings predictability. On other hand, Petrovic et al. (2009) investigates whether earnings volatility helps to predict subsequent levels of earnings, and concludes that this link is negative. Also, they find that earnings volatility is inversely related to future earnings, when current earnings are high.

In our study, we further explore the role of volatility in forecasting. This paper complements and extends the body of research that studies the relation between ex-ante earnings volatility and earnings predictability. Our study makes two primary contributions to the literature. First, taking into account the level of current firm's performance, we provide causal theory and empirical evidence to the link between volatility and earnings predictability. Nevertheless, previous studies testing this relationship have not mentioned any underlying theory². Note that these studies documented the existence only of a linear relation. Secondly, our study contributes to the vast body of fundamental analysis research that identifies a set of variables that improve valuation¹, by showing that earnings volatility affects the estimation of future earnings. Projections of earnings are used by valuation research and practice to derive estimates of firm value.

¹Beaver et al (1970), Minton et Shrand (1999), Gebhardt et al (2001), Francis et al (2004).

² « Frankel and Litov [2009] criticize Dichev and Tang for neglecting to provide a causal theory underlying their empirical tests. Insofar as the empirical link between volatility and quarterly earnings persistence is concerned, our analysis of this link is subject to the same criticism. » (Cao et Narayanamoorthy, 2009, pp 9).

¹ Stock prices (Collins et al, 1997), Desaggregated earnings (Fairfield et al , 1996), Accruals (Sloan, 1996).

Our finding supports all the predictions. First, we find that earnings volatility is inversely related to earnings persistence and earnings predictability. Second, we examine the sensibility of this relation to the level of current earnings. We document that our relation is particularly pronounced when current performance are high. Otherwise the hypothesis of overinvestment is an important factor in explaining this relationship.

The rest of paper is organized as follows. The next section discusses related research and develops hypothesis. The sample, research design and some summary statics are described in section III. Results are reported in section IV. Some conclusions and ideas of future research are provided in section V.

1. Background and predictions

The volatility of reported earnings is the result of economic shocks and of problems in accounting determination of income. So that, we view that earnings volatility is arising essentially from uncertainty of operations and accounting choices. Both of these factors become part of the permanent earnings series, and reduce the earnings persistence and the earnings predictability.

Before starting the literature review, we present a simple theoretical framework that operationalizes the link between earning volatility and earning predictability. Our analyses is similar to that of Dichev and Tang, 2009; Hamzavi and Aflatooni, 2011; khodadadi et al., 2012; Cao and Narayanamoorthy, 2012. We start our investigation with the commonly used autoregressive regressions of current on 1-year lagged earnings.

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

Taking the variance of both sides yields

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

Assuming that the variance of earnings is stationary over time¹, we obtains

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

¹ Existing research indicates that the volatility of earnings has approximately doubled over the last 40 years, see Givoly and Hayn (2000) and Dichev and Tang(2008). However, the stationary argument holds reasonably well for the 1-year horizon used here.

Var (E) is a proxy of earnings volatility. Var (e) captures the variance of earnings remaining affect having taken into account the effect of the autoregressive coefficient β . So, the variance of error term is a (inverse) proxy of earnings predictability. Equation (3) is a useful guide of the mechanism of the link between earnings volatility and earnings predictability.

Note that var(e) capte the “absolute” predictability, unadjusted for volatility in the earnings environment. If one is interested in “relative” predictability, a natural scalar for var(e) is var(E).

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

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

Equation (4) says that relative predictability is the R^2 of the regression which is equal to the squared 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. Second, we investigate the sensibility of earnings predictability to earnings volatility.

On the literature review, to my knowledge Minton et al. (2002) is the first research that tests the impact of volatility on future earnings « ..., none have considered the role of volatility in forecasting levels of future cash flows or earnings» (Minton et al, 2002, pp 196). The authors find evidence that current cash flows (earnings) are inversely related to future cash flows (earnings). They suggest that this finding is consistent with the underinvestment explication. The effect of volatility on underinvestment is the fact that high volatility increases (1) the cost of external capital, (2) the internal cash flows shortfalls. Moreover, they empirically document that forecasting model that incorporate earnings volatility is better than forecasts from models that exclude volatility, in term of lower forecasts error and less biased predictions.

Lastly and more importantly, prior literature also examines the relation between earnings volatility and earnings predictability, which is more relevant to our study. There is a lack of evidence regarding how accounting volatility affects earnings predictability. « Our knowledge about predictability is limited » (Dichev and Tang, 2009, p161). The recent survey evidence from research of Graham et al. (2005) motivates Dichev and Tang to test the validity of these beliefs. Graham et al. survey 401 managers and find that 97% of respondents prefer smooth earnings. 80% of these managers pronounced aversion to earnings volatility because they believe

that it reduce the predictability of earnings. To enhance the knowledge in this area, Dichev and Tang decide to analyze this link and to provide empirical evidence about it.

They argue that earnings volatility is inversely related to earnings persistence and to earnings predictability. They formed quintiles on earnings volatility, and documents across quintile portfolios that the persistence coefficient declines from 0.93 in the low quintile to 0.51 in the high quintile. Likewise, low volatility earnings have much high coefficient of predictability as compared to high earnings volatility (0.3 vs 0.7). They argue that two factors combine to predict this negative relationship: economic shocks and problems in the accounting determination of reported income. Further, they study whether the financial analysts are aware of the existence of the relation between ex-ante volatility and future earnings persistence. The work of Dichev and Tang has been a staple in this area. Several empirical researches have related this study to the works that we are going to see.

Frankel and Litov (2009) believe that Dichev and Tang address an interesting and relevant issue in which there is little evidence. So, they revisit their findings to provide evidence that supports the existence of a relationship -earnings volatility and earnings persistence- and to verify whether investors completely understand the effects of earnings volatility. They conclude that with additional controls tests the relationship is still robust, and that investors do not underestimate it.

In a similar vein, Hamzavi and Aflatooni (2011) analyses the effect of the income smoothing behavior (inverse proxy of earnings volatility) on earnings persistence and earnings predictability. Similar to previous research and using the same empirical test (quintile test), they find that the earnings predictability and earnings persistence of smoothers is higher than that of other firms. Moreover, more recent literature suggests strong evidence of the negative effect of earnings volatility on earnings predictability. Interestingly, Cao and Narayanamoorthy (2012) extend the analyses to quarterly earnings. Since quarterly earnings have different time-series properties than annual earnings, they use more complicated model than AR(1), that is the Foster model². They report variation in the persistence coefficient “ β ” from 0.425 in the bottom volatility quintile to 0.319 in the top quintile. The result is specific to the two models (Foster and AR(1)) assumption. Consequently, they support the result of Dichev and Tang that past earnings volatility is inversely related to earnings persistence, but they extend this effect to quarterly

² Representative model for quarterly time series

earnings. In addition, they examine whether the ex-ante volatility is priced in stock returns. Otherwise, they study whether the market understands the implication of volatility on earnings surprise autocorrelation. In empirical analyses they document that the market ignore the volatility effects.

Recently, in 2012, Khodadadi and al. lead a study that fits in the line of research driven by Dichev and Tang (2009). They pushed further their research by focusing on the forecasting ability of accounting income volatility and its components (cash flows volatility and accruals volatility). The empirical results imply that the volatility in earnings is more important in the relation to earnings predictability, than cash flows volatility and accruals volatility. The negative relationship has a remarkable differentiating power in the long horizon of prediction (5 years).

The study of Petrovic and al. (2009) which is relevant to our study examines the relation between ex-ante volatility and future firm performance. They find that ex-ante earnings volatility is inversely related to future expected earnings. More importantly, they shows that this link is more pronounced for the highest earnings firms. Motivated by the under/overinvestment hypothesis, they document that the inverse association between earnings volatility and persistence is explained by persistence and overinvestment arguments when earnings are high.

The negative relation between volatility and future earnings can be predicted by the underinvestment and overinvestment story. Based on the underinvestment story, Froot et al. (1993) and Smith and Stulz (1985) find that future cash flows performance is negatively associated with contemporaneous volatility. Earnings volatility exacerbates the lack of funds (Petrovic et al., 2009) and increases the cost of capital due to information asymmetry (Stiglitz and Weiss, 1981). The consequent is a more sensitive investment to level of internally generated cash flows. Holding all other factors constants, firm with high volatility will forgo investment, consequently, it will have lower future profitability relative to current profitability. Motivated by the underinvestment story, Minton and Schrand (1999) show that earnings volatility reduces the average investment over six years that leads to lower future cash flows (earnings) only for firms with medium and high cash flows (earnings) levels.

Similarly, the overinvestment explains the relation between volatility and future earnings. Earnings volatility increases the likelihood of excess liquidity (Petrovic et al. 2009). Under the theory of agency cost, managers of firms with high level of internal resources may be tempted to increase investment in negative NPV projects (Jensen, 1986; Stulz, 1990). Thereby, high volatility of reported earnings leads to overinvestment and lower future earnings.

Since underinvestment and overinvestment cause investment distortion, we predict that earnings volatility reduces future profitability, for extreme levels of earnings. Prior literature has documented that ex-ante volatility reduces earnings persistence that measures how fast earnings revert to the mean. This implies that, at low and high levels of earnings, more volatile earnings are less persistent and revert faster to the mean. Consequently, when earnings are low, the relationship volatility-future profitability is positive, and negative in the opposite case (high earnings).

We predict that the story of underinvestment/overinvestment explains the negative sensibility of future earnings to high volatility. However, the persistent arguments imply positive volatility/future earnings for firms with the lowest earnings realizations. Consequently, this relation cannot combine the two hypotheses (persistence/underinvestment). This relation cannot be predicted unambiguously when actual earnings are low.

To sum up, prior research suggests strong evidence of a negative relation between volatility and earnings persistence/earnings predictability. Prior studies also show that this link is more pronounced when current profitability is high.

Our two hypotheses are:

H₁ : the earnings predictability of more volatile earnings are less than that of less volatile earnings.

H₂: the sensibility of earnings predictability to ex-ante volatility is more pronounced among profitability firms.

2. Main empirical tests

A. Sample selection and variable measurement

Quarterly data is obtained from Reuters base. Our sample consists of non-financial firms listed on Toronto stock exchange from 2006 to 2011. Quarterly earnings are defined as net profit. Since net profit included transitory and exceptional items, it may capture some elements of economic uncertainty; consequently it's more volatile than operating profit. Consistent with prior research earnings are scaled by the average of total assets (considered as natural deflator).

Earnings volatility is calculated by taking the standard deviation of the deflator earnings for the most recent twelve quarters (Wei et Zhang, 2006 ; Abdel-Khalik, 2007 ; Chen et al, 2008 et Bandyopadhyay, 2011). We construct our sample as follow. First, since our earnings volatility measure used earnings from the past twelve quarters, our study requires minimum of eleven consecutive quarters of data. Second, to avoid the influence of extreme observations, our variables (earnings and volatility) are winsorized at the 1st and 99th percentiles. After all requirements the final sample includes 6317 firm-quarterly observations over 2006-2011.

The variable « earnings persistence » is measured through the coefficient of autoregressive regression of current on one lagged earnings. Since quarterly earnings have different time-series properties than annual earnings, we used two representative models for quarterly time series, Foster and AR(1) models. Earnings predictability is calculated as the R² of this regression. The measures of earnings persistence and predictability is widely used in the related literature (Dichev et Tang, 2009 ; Frankel et Litov, 2009 ; Petrovic et al, 2009 ; Hamzavi et Aflatooni, 2011 ; khodadadi et al, 2012 ; Cao et Narayanamoorthy, 2012).

B.Summary statistics

Descriptive statistics of the full sample are presented in table1.

Table 1: Descriptive statistics

	Et	VOLt
Mean	-0.0061538	0.0410445
Median	0.0041152	0.02225
Std. Dev.	0.0675976	0.0598286
Minimum	-0.9321037	0.0004571
Maximum	0.4716419	0.7448399

Notes: Et is defined as net earnings ,vol_t is defined as the firm-specific volatility of earnings , which is calculated as the standard deviation of earnings over the most recent twelve quarters

Firm specific earnings has a mean of -0,6% and a median of 4%. So the sample is left skewed in the earning variable. The descriptive for volatility of earnings also reveal that this variable has a non linear distribution (mean: 4%, median :2.2%). The standard deviation of VOL is small (5%) indicating small difference in earnings volatility across firms.

Table 2 illustrates the unconditional correlation between earnings variables and earnings volatility.

Table 2: Correlation table

	E_t	E_{t+1}	VOL_t
E_t	1		
E_{t+1}	0.5191*	1	
VOL_t	-0.3280*	-0.2668*	1

E_t is defined as net earnings, vol_t is defined as the firm-specific volatility of earnings, which is calculated as the standard deviation of earnings over the most recent twelve quarters

** and * denote statistical significance at 5% and 10% levels, respectively.

Pearson correlation coefficient shows that earnings volatility is significantly negatively correlated with future and current earnings. This finding is generally supportive of our hypothesis. This unconditional correlation tests can not verify the non-linear volatility-future earnings relation.

In table 3, we present mean current earnings, volatility and future earnings across current earnings quintiles³.

Table 3: Mean Earnings and Earnings Volatility by Earnings Quintiles

Quintile E_t	Mean E_{t+1}	Mean E_t	Mean Diff(E)	Mean VOL_t
1 (lowest)	-0.0309921	-0.0484064	0.01669	0.0572032
2	0.0012138	0.003724	-0.0025389	0.0231427
3 (highest)	0.0185946	0.0322185	-0.0135626	0.0030572

E_t is defined as net earnings. vol_t is defined as the firm-specific volatility of earnings, which is calculated as the standard deviation of earnings over the most recent twelve quarters. Mean Diff(E) is the mean of the changes between E_{t+1} and E_t .

This table indicates that from the lowest to the highest earnings quintiles, volatility decrease (5.7% to 0.3%). The finding confirms a negative correlation between earnings one – year ahead and volatility. The result supports the conservatism hypothesis. Accounting conservatism document that all anticipated losses are recognized. Such losses are transitory and revert faster to the pre-loss level, creating additional volatility (Basu, 1997; Pope et Walker,

³ We partition current earnings into 3 quintiles : quintile1 (low current earnings), quintile 2 (medium current earnings), and quintile 3 (high current earnings)

1999; Ball et al, 2001). Therefore, it's reasonable to expect that earnings volatility weakens as current earnings level increases.

Similarly, for the lowest and the highest quintile, we observe that the difference between future earnings and current earnings is more important than the difference of medium quintile. The result shows that at the extreme level of current earnings, future earnings revert faster to the mean (Brooks et Buckmaster, 1976, Freeman et Ohlson, 1982, Fama et French, 2000).

C. Research design

Based on the first hypothesis, we predict that volatility reduce earnings persistence and earnings predictability. Second after documenting this result, we turn to test the second hypothesis, when we predict that the negative relation is expected to be stronger for high current earnings. The validity of each hypothesis will be tested in a two-stage model. The first verifies the effect of volatility on future earnings. It's a preliminary test which is likely to strengthen our hypothesis. While the second test, examine the correlation between earnings volatility and earnings persistence.

- $H_{1,1}$:The linear relation
 - ✓ Volatility-future earnings

The starting point in forecasting future earnings is current earnings. The target of this test is to explore whether the inverse relation between earnings volatility and future earnings is still valid after controlling for current earnings. Our benchmark model is the first autoregressive equation AR(1), which regress future earnings on current earnings. In the second model we include earnings volatility as an extra-regressor.

$$\text{Model (1) : } E_t + 1 = \alpha + \beta E_t + \delta \text{ (modèle de référence)}$$

$$\text{Model (2) : } E_t + 1 = \alpha + \beta_1 E_t + \beta_2 VOL_t + \delta$$

This test provides a simple empirical analysis of the linear correlation between earnings volatility and future earnings.

- ✓ Earnings volatility- future earnings persistence and earnings predictability

Since we want to examine the impact of volatility on earnings predictability, we sort the sample into three portfolios according to the level of their earnings volatility in ascending order. So we obtain three quintiles, each containing a third of the population (Q1: the lowest volatility

quintile, Q2: the medium volatility quintile, Q3: the highest volatility quintile). For each quintile, we present the persistence coefficient and the R^2 of regression of 1-year-ahead earnings and current earnings (and the regression of Foster model). These results provide evidence about the economic and statistical significance of the first hypothesis.

- H_2 : The non linear relation
 - ✓ Earnings volatility-future earnings

This test examine whether the volatility-future earnings relation varies with the level of currents earnings. First, we partition current earnings into three quintiles. Second we run model 2 (wish include earnings volatility as an extra regressor) for portfolios sorted by earnings level. This partition provides more formal tests of the non-linear relation and reveals whether the effect of volatility is more pronounced for the most profitable firms.

- ✓ Earnings volatility-future earnings persistence and earnings predictability

This test provides evidence on whether volatility is related to future persistence in a non linear way as hypothesis (H_2). First, we sort earnings volatility into three portfolios. Each of these portfolios is, then, sorted into three further quintiles based on their level of current earnings. These yield nine quintiles. So we can observe whether volatility strongly predicts decreases on earnings persistence only for highest quintile of earnings.

3 .Empirical results

- H_1 : The linear relation
 - ✓ Earnings volatility-future earnings

The estimator coefficients from the two regressions are presented in table 4.

Table 4: Regression Results of models 1 and 2

	Model 1		Model 2	
	Coef.	t-stat	Coef	t-stat
intercept	-0.0015	-1.05	0.0016	0.215
Et	0.5436	15.07***	0.5319	16.28***
VOLt			-0.0857	-2.91***
adjusted R ²	0.3047		0.3335	

NotesModel (1) : $E_t + 1 = \alpha + \beta E_t + \delta$ Model (2) : $E_t + 1 = \alpha + \beta_1 E_t + \beta_2 VOL_t + \delta$

where E is earnings and VOL is earnings volatility

*p<0.10, **p<0.05, ***p<0.01

The summary result for the significance of current earnings shows, for the benchmark model, that the persistence coefficient is statistically significant. When volatility is added as an extra regressor in M2, this coefficient falls marginally. Further, we observe that the coefficient in the interaction between future earnings and volatility is negative. An increase in the firm-specific earning volatility by one unit would result in a small decrease of 8.57 percentage points in future earnings. The inverse relation supports previously our first hypothesis. This is consistent with the finding that earnings reduce future earnings (Minton et Shrand, 1999; Minton et al., 2002; Petrovic et al., 2009). To give added strength to our tests, we use another model which reflects the properties of quarterly data that is the Foster model. The results are similar to those generated by AR(1) model.

✓ Earnings volatility-earnings predictability

Table 5 presents the persistence coefficient β and the R-squared of AR(1) regressions by earnings volatility quintiles.

Table 5: Regression results by quintiles of earnings volatility

Quintiles by VOL	$E_{t+1} = \alpha + \beta E_t + \delta$	
	β (persistence)	Adj R ²
Quintile 1	0.7850***	0.3590
Quintile 2	0.6555 ***	0.3387
Quintile 3	0.3440 ***	0.1537
Difference (quintile1- quintile5)	0.441	0.2053
p-value on difference	<0.001	<0.001

Notes : E_t is defined as net earnings. vol_t is defined as the firm-specific volatility of earnings , which is calculated as the standard deviation of earnings over the most recent twelve quarters, The p-value for the difference in persistence coefficients across quintiles is derived from a t-test. The p-value for the difference in the Adj. R2 across quintiles is derived from a bootstrapped test. *p<0.10, **p<0.05, ***p<0.01

The persistence coefficient declines from 0.785 in Q1 (the lowest quintile) to 0.311 in Q3 (the highest quintile). The adjusted R-squared declines from 35.9% to 15.37%. The table displays also a test of statistical significance of the difference in coefficient of persistence. It's a simple t-test which indicates that the difference in persistence (0.441) between quintile 1 and 3 for earnings volatility are highly significant (p<0.001). The test for difference in R² is a bootstrap test. The test statistic is the difference in adjusted R² between earnings volatility quintile 1 and 3. This test indicates that the difference in R² is highly significant. Therefore, while earnings volatility increases across quintiles, persistence coefficient and adjusted R squared significantly decline. Thus, in this case we conclude that earnings volatility is inversely related to future earnings persistence and earnings predictability. This finding confirms the first hypothesis (H1). The above finding are consistent with the story that volatility of reported earnings can stem from uncertainty about business operations and of accounting choices and conventions for example quality of estimation in accruals and poor matching between expenses and related sales. The noise components of volatility cause faster earnings revert to the mean when earnings are far below or above expected earnings.

Our results are consistent with the empirical findings for annual earnings with Dichev and Tang (2009), Frankel and Litov (2009), Hamzavi and Aflatooni (2011) and Khodadadi et al. (2012) and for quarterly earnings with Cao and Narayanamoorthy (2012).

The next objective of this study is to test whether volatility-future earnings persistence varies with the level of current profitability (H2).

- H₁: The non linear relation
 - ✓ Earnings volatility-future earnings

In table 6 we provide the results for the hypothesis that the negative relation (volatility-future earnings) is expected to be stronger for high rather for low level of earnings volatility.

Table 6 : regressions results for coefficients on earnings volatility by earnings quintiles

$Et + 1 = \alpha + \beta_1 Et + \beta_2 VOLT_t + e$		
	β_1	β_2
Quintile 1	0.3568***	0.3116
Quintile 2	0.5208**	-0.1312**
Quintile 3	0.4536 ***	-0.2112***
Difference (quintile1- quintile5)		0.5228**

Notes: Et is defined as net earnings. vol_t is defined as the firm-specific volatility of earnings , which is calculated as the standard deviation of earnings over the most recent twelve quarters, The p-value for the difference in persistence coefficients across quintiles is derived from a t-test. *p<0.10, **p<0.05, ***p<0.01

The results show that the earnings persistence coefficient is low for the extreme earnings quintile (Q1 and Q3). This is consistent with the finding that the low and the high levels of earnings mean revert faster than do intermediate levels (Brooks and Buckmaster, 1976; Freeman and Ohlson, 1982 and Fama and French, 2000). The coefficient on earnings volatility is positive and insignificant for low earnings quintile but becomes negative for quintiles 2 and 3. The magnitude for the high earnings quintile is 2 times and half higher than for the full sample (table 1). If firm-specific volatility increases by one unit, future earnings decreases by 21 percentage points for the highly profitable firms. As expected, our results thus far indicate that volatility is a negative predictor of earnings when current earnings are high. This finding is generally consistent with Petrovic et al. (2009) and Dichev and Tang (2009) who find that the negative effect of volatility is more pronounced for high earnings portfolios.

- ✓ Earnings volatility-earnings predictability

Table 7 presents results of the ability of earnings volatility to successfully predict future earnings predictability for highly profitable firms.

Table 7: regressions results by earnings volatility quintiles conditional on current earnings quintiles

$E_{t+1} = \alpha + \beta E_t + \delta$		<i>Quintiles by VOL_t</i>			
		<i>Q 1</i>	<i>Q 2</i>	<i>Q 3</i>	<i>Difference (Q1-Q3)</i>
<i>Quintiles by E_t</i>					
<i>Q1</i>	β	0.1839**	0.028	0.1973**	-0.1078
	Adj R ²	0.629	0.1896	0.0859	-0.023
<i>Q2</i>	β	0.4956***	0.4128***	0.2676*	0.1533**
	Adj R ²	0.2552	0.1235	0.1216	0.1336***
<i>Q3</i>	β	0.2010***	0.1764**	0.1002***	0.4069***
	Adj R ²	0.1671	0.1006	0.0469	0.1008**

Notes: : E_t is defined as net earnings. vol_t is defined as the firm-specific volatility of earnings, which is calculated as the standard deviation of earnings over the most recent twelve quarters. The p-value for the difference in persistence coefficients across quintiles is derived from a t-test. The p-value for the difference in the Adj. R² across quintiles is derived from a bootstrapped test. *p<0.10, **p<0.05, ***p<0.01

We find that, for the most profitable firms, high volatility firms command 40 percentage points earnings persistence discount relative to low volatility firms. For medium earnings ranks, high volatility firms' coefficient of persistence decline around 15 percentage points more than low volatility firms. However, if current earnings are low, the earnings persistence raises insignificantly when earnings volatility increases across quintiles. Moreover, the negative effect of volatility on earnings predictability is more pronounced for the highly profitable firms. (effectiveness), for the high quintile of earnings, adjusted R² declines from 16.71% (Q1 of volatility) to 4.69% (Q3 of volatility). Nevertheless, it arises for the low quintile of earnings. Both the persistence and the R² differences across extreme quintiles are statistically significant. Thereby volatility is a strong negative predictor of earnings persistence and earnings predictability for the high profitable firms. The above findings are consistent with the second hypothesis (H₂) of non linear effect of volatility. Our results are consistent with the behavioral explanations of overinvestment and earnings persistence.

Managers of high profitable firms may be tempted to invest beyond optimal level, under the theory of agency cost. Alack of internal funds may increases the likelihood of underinvestment du to higher costs of external financing. Volatile earnings increase likelihood of shortage and excess of internal funds. Thereby, high volatility of reported earnings leads to overinvestment or underinvestment. Since earnings volatility increases the investment distortions, it should be negatively related to future earnings. Under the story of persistence, at low and high levels of earnings, more volatile earnings are less persistence. This induces a positive relation between earnings volatility and future earnings when current earnings are low. This story is contradictory with the explanations of underinvestment. However, persistence and overinvestment arguments reinforce each other, when current earnings are high.

4. Conclusion

This paper tests the hypothesis that earnings volatility has a negative effect on earnings predictability. While, prior works empirically improve that conditioning on earnings volatility significantly reduce earnings predictability, no prior work has directly investigated the sensibility of this relation to the level of current earnings. Like so, the next objective of this study is to test whether volatility-earnings predictability is expected to be stronger for high rather for low level of earnings volatility.

In general, we find that earnings volatility has an inverse relationship with earnings predictability. Our results also show that the sensibility of earnings predictability to ex-ante volatility is more pronounced among profitability firms. The findings are most consistent with overinvestment and persistence explanations. These findings open a number of possibilities for future research. One potential direction is the extent to which the implication of volatility is priced in stock returns. Another future direction is exploring the forecasting ability of the components of earnings volatility, namely income smoothing and variability in operating performance.

References

- Bandyopadhyay S., Huang A. et Wirjanto T., (2011), « Does Income Smoothing Really Create Value ? », *University of Waterloo, Working Paper*.
- Basu S. (1997), “The Conservatism Principle and the Asymmetric Timeliness of Earnings”, *Journal of Accounting and Economics*, Vol.24, pp.3–37.
- Beaver W., Kettler P. et Scholes M. (1970), « The association between market and accounting determined risk measures », *The Accounting Review*, Vol.45, pp.654-682.
- Brooks L. et Buckmaster D., (1976), « Further evidence of the time series properties of accounting income », *Journal of Finance*, Vol.31, pp.1359-1373.
- Cao S.S. et Narayanamoorthy G.S. (2012), « Earnings volatility, Post-Earnings Announcement Drift and Trading Frictions », *Journal of Accounting Research*, Vol.50, n°1, pp.41-74.
- Chen C., Huang A.G. et Jha R. (2008), « Trends in Earnings Volatility, Earnings Quality and Idiosyncratic Return Volatility: Managerial Opportunism or Economic Activity », *School of Accounting and Finance, University of Waterloo*.
- Collins D., Maydew E. et Weiss I. (1997), « Changes in the value-relevance of earnings and book values over the past forty years », *Journal of Accounting and Economics*, Vol.24, pp.39-67.
- Dichev I.D. et Tang V.W., (2009), “Earnings volatility and earnings predictability”, *Journal of Accounting and Economics*, Vol.47, pp.160-181.
- Foster G. (1977), “Quarterly accounting data: time-series properties and predictive-ability results”, *The Accounting Review*, Vol.52, pp.1–21.
- Francis J., LaFond R., Olsson P. et Schipper K. (2004), « Cost of equity and earnings attributes », *The Accounting Review*, Vol.79, pp.967-1010.
- Froot K., Scharfstein D. et Stein J. (1993), “Risk Management: Coordinating Investment and Financing Policies”, *Journal of Finance*, Vol.48, pp.1629–1658.
- Frankel. et Litov. (2009), « Earnings Persistence », *Journal of Accounting and Economics*, Vol.47, pp.182-190.
- Freeman R., Ohlson J. et Penman S. (1982), « Book Rate-of-Return and Prediction of Earnings Changes: An Empirical Investigation », *Journal of Accounting Research*, Vol.20, n°2, pp. 639–53.

- Gebhardt W.R., Lee C.M.C. et Swaminathan B. (2001), “Toward an Implied Cost of Capital.”, *Journal of Accounting Research*, Vol.39, pp.135–176.
- Graham J., Campbell H. et Rajgopal S. (2005), “The economic implications of corporate financial reporting”, *Journal of Accounting and Economics*, Vol.40, pp.3–73.
- Hamzavi M.A. et Aflatooni A. (2011), « Earnings Smoothing and Earnings Predictability », *Business Intelligence Journal*, pp. 187-201.
- Jensen M.C. (1986), “Agency costs of free cash flow, corporate finance, and takeovers”, *The American Economic Review*, Vol. 76, n°2, pp. 323-9.
- Khodadadi V., Tamjidi N., Fazeli Y.S. et Hushmandi K.B. (2012), « Earnings Predictability and its Components Volatility », *International Reserch Journal of Finance and Economics*, Vol.86, pp.72-85.
- Minton B. et Schrand C. (1999), « The Impact of Cash Flow Volatility on Discretionary Investment and the Costs of Debt and Equity Financing », *Journal of Financial Economics*, Vol. 54, n°3, pp. 432–60.
- Minton B., Schrand C. et Walther B. (2002), « The Role of Volatility in Forecasting”, *Review of Accounting Studies*, Vol. 7, pp. 195–215.
- Petrovic N., Manson S. et Coakley J. (2009), « Does Volatility Improve UK Earnings Forecasts ? », *Journal of Business Finance & Accounting*, Vol.36, n°9-10, pp. 1148-1179.
- Sloan R. (1996), “Do stock prices fully reflect information in accruals and cash flows about future earnings?” *The Accounting Review*, Vol. 71, pp. 289–316.
- Stiglitz J. et Weiss A. (1981), « Credit rationing in markets with imperfect information ». *American Economic Review*, Vol.71, pp.393-410.
- Wei S.X. et Zhang C. (2006), « Why did individual stocks become more volatile? », *Journal of Business*, Vol. 79, pp. 259-292.