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Earnings Predictability and its Components Volatility

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Abstract

This paper studies the earnings, cash from operations and accruals volatility and earnings predictability in Tehran Stock Exchange (TSE) from 2002 to the end of 2007. The analysis of the relation between earnings volatility and earnings predictability relies on commonly used autoregressive regressions of current on one-year lagged earnings. To examine the role of lagged earnings components (CFO and accruals) to predicting current earnings, this paper also regressing current earnings on one-year lagged operating cash flows and accruals: To alleviate concerns about a mechanical relation, this paper uses pre-determined measures of volatility (i.e., standard deviation) to partition the data into volatility quartiles and then use data to estimate earnings predictability. This paper uses a test based on simulating the empirical distribution of the adjusted R^2s and persistence coefficients in quartiles.

Consistent with existing literature, results show that, earnings, cash from operations and accruals volatility and earnings persistence are negatively related to earnings predictability. Also, results show that while the volatility of earnings, cash from operations and accruals are increased, the role of earnings, cash from operations and accruals in predicting future earnings are declined. Finally, results show that, while predictive horizon increase, earnings predictability decrease gradually.

Survey evidence indicates widely held managerial beliefs that earnings and its components volatility are negatively related to earnings predictability.

Keywords: Earnings volatility: earnings predictability; cash from operations; accruals.
JEL Classification Codes: G12, M41

1. Introduction

This study investigates the relation between earnings and its components volatility and earnings predictability. There is a long-standing interest in earnings prediction in the accounting literature and there are at least five reasons for research on the time-series properties of earnings (see Watts and Zimmerman (1986, Chapter 6), Schipper (1991), and Brown (1993) for discussions of some of these reasons). First, almost all models of valuation either directly or indirectly use earnings forecasts. The discounted cash flow valuation models (Fama and Miller, 1972, Chapter 2) often use forecasted earnings, with some adjustments, as proxies for future cash flows. The analytically equivalent residual-income valuation models (e.g., Edwards and Bell, 1961; Ohlson, 1995; Feltham and Ohlson, 1995) discount forecasted earnings net of "normal" earnings. Second, capital markets research that correlates financial statement information with security returns frequently uses a model of expected earnings to isolate the surprise component of earnings from the anticipated component. Third, the efficient markets hypothesis is being increasingly questioned, both empirically and theoretically (with behavioral finance models of inefficient markets; see Daniel et al., 1998; Barberis et al., 1998; Hong and Stein, 1999). Accounting-based capital market research has produced evidence that is apparently inconsistent with market efficiency. A common feature of this research is to show that security returns are predictable and that their predictability is associated with the time-series properties of earnings and/or properties of analysts' forecasts, which creates a demand for research in the time-series properties of earnings and earnings forecasts. Fourth, positive accounting theory research hypothesizes efficient or opportunistic earnings management and/or seeks to explain managers' accounting procedure choices. In this research there is often a need for "normal" earnings that are calculated using a time-series model of earnings. Finally, analyst and management forecasts are a source of information in the capital markets. The forecasts thus affect the information environment and influence the level and variability of security prices. There is a large literature (see Healy and Palepu, 2001) that examines the nature of the information environment, the demand and supply of forecasts, the incentives facing management and analysts and their effect on the properties of the forecasts, the effect of the properties of the forecasts on the variability of security returns and cost of capital, etc.

Also, there are at least three reasons for researchers' interest in the properties of earnings components. First, to examine whether earnings components are incrementally informative beyond earnings in their association with security prices. This research is generally aimed at evaluating standards that require earnings components to be disclosed and fundamental analysis. Conclusions about the incremental association or information content of earnings components hinge on the accuracy of the proxies for the unexpected portion of the earnings components, which creates a demand for the time-series properties of earnings components. Second, accruals and cash flows are the two most commonly examined components of earnings. Operating accruals represent accountants' attempt to transform operating cash flows into earnings that are more informative about firm performance and thus make earnings a more useful measure for contracting and/or in fundamental analysis or valuation. However, self interested managers might use accounting discretion opportunistically and manipulate accruals, which would distort earnings as a measure of firm performance. Tests of accrual management hypotheses based on positive accounting theory examine accounting accruals' properties. These tests provide a motivation for research in the time-series properties of accruals and cash flows and other earnings components (e.g., current and non-current accruals, operating and investing cash flows, etc.). Finally, interest in the time-series properties of earnings components also arises because summing the forecasts of the components might yield a more accurate forecast of earnings. The logic here is similar to that underlying the aggregation of quarterly earnings forecasts to improve the accuracy of annual earnings forecasts. The difference is that the aggregation of components is contemporaneous (i.e., cross-sectional) whereas the aggregation of quarterly forecasts is temporal. In both cases the assumption is that there is a loss of information in aggregation (Kothari, 2001).

Recent survey evidence reveals widely held managerial beliefs that earnings volatility reduces earnings predictability (Graham et.al. 2005). This study is a test of the validity and utility of these beliefs. Existing findings offer some conjectures about the mechanism that drives the relation between earnings and its components volatility and earnings predictability. Dichev and Tang (2009) view earnings volatility as arising from two factors, volatility due to economic shocks and volatility due to problems in the accounting determination of income, and both of these factors reduce the predictability of earnings. This paper presents a simple theoretical framework that operationalizes these concepts, and links them to the empirical tests that follow.

The empirical specifications focus on establishing the relation between earnings and its components volatility and short-and long-term earnings predictability. To alleviate concerns about a mechanical relation, similar to Dichev and Tang (2009) this paper uses pre-determined measures of volatility to partition the data into volatility quartiles and then use data to estimate earnings predictability. Results also show that the strength of the earnings volatility effect exceeds that of several plausible benchmarks, including cash flows volatility and the accrual effect from Sloan (1996). Results from short-run tests show that there is a negative linkage between earnings and its components volatility and earnings predictability. Consistent with Dichev and Tang (2009), results from the long-run tests indicate that earnings volatility has substantial predictive power for up to 5 years in the future. Earnings with low volatility have remarkably high persistence and adjusted R^2 during the entire predictive horizon, while earnings with high volatility show quick reversion to the mean and little reliable predictability.

The remainder of the paper is organized as follows. Section 2 presents the previous related researches. Section 3 presents theory and research design of the paper. Section 4 presents the main empirical tests and results. Finally, the last section provides conclusions.

2. Literature Review

This paper aims to enhance the knowledge about long and short-term predictability by investigating the relation between earnings and its components volatility and earnings predictability. There are a number of useful models and results for 1-year-ahead forecasts, for example, mean reversion, the Foster (1977) model of quarterly earnings, the accrual effect due to Sloan (1996), and the fundamental analysis signals due to Lev and Thiagarajan (1993) and investigated in Abarbanell and Bushee (1997). In contrast, there are few useful long-term results. This dearth of results seems unsatisfactory because some key applications (e.g., equity valuation) require long-term forecasts of earnings, and it is the accuracy of the forecasts which drives the success of these applications. The motivation stems from several sources which suggest that earnings volatility captures aspects of the determination of earnings which are related to the predictability of earnings. First, recent survey evidence offers strong motivation for the link between earnings and its components volatility and earnings predictability. Graham et.al (2005) survey 401 financial executives to determine the key factors that drive decisions related to reported earnings and find a pronounced a version to earnings volatility (97% of respondents express a preference for smooth earnings). In exploring the reasons for this finding, they find that executives abhor volatility because it is thought to reduce the predictability of earnings (80% of respondents express this belief). Thus, the investigation is a test of widely held managerial beliefs that earnings and its components volatility are negatively related to earnings predictability. The survey evidence leaves little doubt that executives believe that more volatile earnings are less predictable.

Lipe (1990) explores the relation between economic volatility and earnings predictability in a short-horizon setting. However, this relation is a side issue for Lipe (1990) and from his evidence it is difficult to gauge the economic and long-term importance of this relation.

On a more subtle level, the volatility of reported earnings also reflects important aspects of the accounting determination of income, which also provide a link to earnings predictability. One such aspect is the quality of matching of expenses to revenues, as modeled in Dichev and Tang (2008). The basic idea in Dichev and Tang is that poor matching acts as noise in the economic relation between revenues and expenses, and thus the volatility of reported earnings increases in poor matching. Poor matching is also associated with poor earnings predictability because the matching noise in reported earnings obscures the underlying economic relation that governs the evolution of earnings over successive periods. Thus, the joint effect of poor matching on earnings volatility and earnings predictability suggests another link between these two variables. The quality of accruals effect in Dechow and Dichev (2002) is another aspect of the determination of earnings which provides an accounting link between earnings volatility and earnings predictability. Dechow and Dichev argue that many accruals estimate future cash flows, and therefore large magnitudes of estimation errors in accruals signal lower quality of earnings and lower predictability of earnings. Since estimation errors are likely to be more serious in volatile environments, this suggests a negative relation between earnings volatility and earnings predictability.

Dichev and Tang (2009) find that the consideration of earnings volatility brings substantial improvements in the prediction of both short-and long-term earnings. Conditioning on volatility information also allows one to identify systematic errors in analyst forecasts, which implies that analysts do not fully understand the implications of earnings volatility for earnings predictability. They find that, it is also possible that the link between earnings volatility and earnings predictability reflects other factors (e.g., earnings smoothing behavior, where managers smooth earnings to provide a more predictable measure of firm performance). Finally, they provide evidence on the relative role of common economic and accounting factors in the documented relations.

Das et al. (1998) suggest that as earnings become less predictable, analysts issue increasingly optimistic forecasts to please managers and consequently gain, or at least limit the loss of, access to managers' private information. Eames and Glover (2003) reexamine the association between earnings forecast error and earnings predictability because there is evidence suggesting that deliberate earnings forecast optimism is not an effective mechanism for gaining access to managers' information. They document associations between earnings level and both forecast error and earnings predictability. These associations suggest that earnings level may be an important control variable when examining the association between forecast error and earnings predictability. When they control for the level of earnings they find no significant association between forecast error and earnings predictability. Thus, they find no evidence that analysts intentionally issue optimistically biased earnings forecasts.

Crabtree and Maher (2005) examine the role that earnings predictability plays in establishing a firm's cost of debt capital by measuring its influence on establishing a new issue's bond rating. In addition, they also examine the effects of earnings predictability on the initial pricing of the firm's debt. Using new corporate bond issues from the period 1990–2000, their results indicate that the degree of predictability of a firm's earnings is positively associated with a firm's bond rating. Moreover, earnings predictability is also documented to be negatively associated with the offering yield. Importantly, bond rating classification accuracy is improved when specific measures of a firm's earnings predictability are added to a robust model.

3. Research Design

This paper starts investigation with some theoretical considerations. The goal is to provide a simple framework that formalizes the preceding motivations and link them to the empirical analysis that follows. Based on Dichev and Tang (2009), the analysis of the relation between earnings volatility and earnings predictability relies on commonly used autoregressive regressions of current on 1-year lagged earnings:

$$EA_t = \alpha + \beta EA_{t-1} + \varepsilon 1 \quad (1)$$

To examine the role of lagged earnings components (CFO and accruals) to predicting current earnings, this paper also regressing current earnings on 1-year lagged operating cash flows and accruals:

$$EA_t = \alpha + \beta_1 CFO_{t-1} + \beta_2 ACC_{t-1} + \varepsilon 2 \quad (2)$$

Now, taking the variance of both sides of (1) and (2) yields, (3) and (4), respectively:

$$\sigma^2_{EA_t} = \beta^2 \sigma^2_{EA_{t-1}} + \sigma^2_{\varepsilon 1} \quad (3)$$

and

$$\begin{aligned} \sigma^2_{EA_t} &= \sigma^2_{(CFO_t + ACC_t)} = \beta_1^2 \sigma^2_{CFO_{t-1}} + \beta_2^2 \sigma^2_{ACC_{t-1}} + \sigma^2_{\varepsilon 2} \\ \sigma^2_{CFO_t} + \sigma^2_{ACC_t} + 2\gamma_{CFO_t ACC_t)} &= \beta_1^2 \sigma^2_{CFO_{t-1}} + \beta_2^2 \sigma^2_{ACC_{t-1}} + \sigma^2_{\varepsilon 2} \end{aligned} \quad (4)$$

Assuming that the earnings, cash from operations and accruals are stationary over time [1], they would have constant variance over time ($\sigma^2_{EA}, \sigma^2_{CFO}$ and σ^2_{ACC}) and then re-arranging (3) and (4), this paper obtains (5) and (6), respectively:

$$\sigma^2_{\varepsilon 1} = (1 - \beta^2)\sigma^2_{EA} \quad (5)$$

$$\sigma^2_{\varepsilon 2} = (1 - \beta_1^2)\sigma^2_{CFO} + (1 - \beta_2^2)\sigma^2_{ACC} + 2\gamma_{(CFO_t ACC_t)} \quad (6)$$

where $\sigma^2_{EA}, \sigma^2_{CFO}$ and σ^2_{ACC} are proxies for volatility of earnings, cash from operations and accruals, respectively and $\gamma_{(CFO_t ACC_t)}$ is the covariance between cash from operations and accruals. $\sigma^2_{\varepsilon 1}$ and $\sigma^2_{\varepsilon 2}$ are (inverse) proxies for earnings predictability, because the variance of the error terms captures the variation in earnings remaining after accounting for the effect of the autoregressive coefficient, β, in Eq. (5) and coefficients β_1 and β_2 in Eq. (6).

Eq. (5) is also a useful guide to the mechanism of the link between earnings volatility and earnings predictability, revealing a two-fold relation. First, holding earnings persistence constant, earnings volatility is inversely related to earnings predictability. Second, this negative relation is likely strengthened through the effect of the persistence coefficient because, as discussed above, there are reasons to believe that β itself is negatively related to volatility of earnings. For example, economic or accounting noise in earnings is likely to both increase the earnings volatility and decrease the earnings persistence.

Eq. (6) is useful guide to express the negative relation between earnings components volatility and earnings predictability. Holding $(1-\beta_1^2)$, $(1-\beta_2^2)$, accrual volatility and $\gamma_{(CFO_t ACC_t)}$ constant, CFO volatility is negatively related to earnings predictability. This negative relation is strengthened through the effect of the β_1. There is similar story on accruals and β_2.

Note that, there is no statistical reason to expect a relation between σ^2_{EA} and β or between σ^2_{CFO} and β_1 or between σ^2_{ACC} and β_2. The volatility of earnings, cash from operations and accruals can be high or low, and they have no necessary relation to β, β_1 or β_2, respectively.

To formally examine the mentioned mechanism of the link between earnings volatility and earnings predictability, this paper takes the total derivatives of the variance of the error term, $\sigma^2_{\varepsilon 1}$, with respect to earnings volatility. Using expression (5) and denoting total (partial) derivative as d (δ) yields:

$$d[\sigma^2_{\varepsilon 1}] / d[\sigma^2_{EA}] = (1 - \beta^2) - 2\beta\sigma^2_{EA}(\partial\beta / \partial[\sigma^2_{EA}]) \quad (7)$$

The first term in Eq. (7) suggest that the strength of the relation between earnings volatility and earnings predictability is determined by earnings persistence, where higher persistence signifies more predictable earnings. The second term in Eq. (7) represents the second link between earnings volatility and earnings predictability through the effect of earnings volatility on earnings predictability. Specifically, the negative effect of earnings volatility on earnings persistence should reinforce the base negative relation between earnings volatility and earnings predictability.

Also, to examine the mechanism of the link between earnings components volatility and earnings predictability, this paper takes partial derivatives of the variance of the error term, $\sigma^2_{\varepsilon 2}$, with respect to CFO and accruals volatility:

$$\partial[\sigma^2_{\varepsilon 2}] / \partial[\sigma^2_{CFO}] = (1-\beta_1^2) - 2\beta_1\sigma^2_{CFO}(\partial\beta_1 / \partial[\sigma^2_{CFO}]) \quad (8)$$

$$\partial[\sigma^2_{\varepsilon 2}] / \partial[\sigma^2_{ACC}] = (1-\beta_2^2) - 2\beta_2\sigma^2_{ACC}(\partial\beta_2 / \partial[\sigma^2_{ACC}]) \quad (9)$$

In Eq. (8) (Eq. (9)), higher β_1 (β_2)signifies more predictable earnings. The second term in Eq. (8) (Eq. (9)) represents the second link between CFO (accruals) volatility and earnings predictability through the effect of CFO (accruals) volatility on β_1 (β_2).

This paper uses the insights from this framework for empirical tests of hypothesis research that earnings and its components volatility are inversely related to earnings predictability.

4. Results

4.1. Sample Selection and Descriptive Statistics

The sample selection starts with the entire population of Iranian firms listed in Tehran Stock Exchange. For data collection purpose, this paper uses the electronic archival data provided by TSE. In some cases that, the required data is incomplete, the manual archive in the TSE's library is used. Also, a part of data is acquired from Tadbirpardaz and Sahra (two Iranian) databases. Accruals are calculated by taking the difference between earnings and cash from operations. Earnings, accruals and cash flow from operations (CFO) are deflated using lagged totals assets and the then, volatility of them are calculated by taking the standard deviation of the deflated items for the most recent 5 years. To avoid the influence of extreme observations, this paper truncates the top and bottom 1% of earnings, accruals and cash flows from operations. This paper limits the sample to 3/20 (the last day of year, based on Iranian (Shamsi) calendar) fiscal year-end firms to simplify the tests and the interpretation of the results. After all requirements, the final sample includes 2054 firm-years over 2002-2007. Descriptive statistics for the full sample are presented in Table1.

Table 1: Descriptive statistics

	EA	CFO	ACC	VOL(EA)	VOL(CFO)	VOL(|ACC|)
Mean	0.14	0.13	0.01	0.17	0.14	0.09
Median	0.12	0.11	0.01	0.10	0.10	0.04
Max.	7.48	5.92	1.57	7.79	2.72	7.67
Min.	-2.41	-2.33	-2.38	0.00	0.00	0.00
Std. Dev.	0.34	0.31	0.13	0.44	0.22	0.39
N	2054	2054	2054	413	413	413

EA is earnings and defined as net income and deflated by lagged total assets. CFO is defined as cash from operating activities in three categories cash flow statement based on Iranian accounting standard#2 and deflated by lagged total assets. ACC is accruals and is calculated as the difference between EA and CFO. VOL(EA) is defined as the firm-specific volatility of earnings, which is calculated as the standard deviation of EA over the research period. VOL(CFO) is defined as the firm-specific volatility of cash from operations, which is calculated as the standard deviation of CFO over the research period. VOL (|ACC|) is defined as the firm-specific volatility of accruals, which is calculated as the standard deviation of absolute amount of accruals over the research period.

Cash flow from operations is lower than earnings (mean of 0.13 vs. 0.14), and accruals are positive (mean of 0.01). Firm-specific volatility of scaled earnings has a mean of 0.17 and a large standard deviation of 0.44, indicating large differences in earnings volatility across firms. While firm-specific volatility of scaled absolute accruals is significantly lower than that of CFO (mean of 0.09 vs. 0.14), the standard deviation of volatility of absolute accruals is higher than that of CFO (0.39 vs. 0.22).

Table 2 provides correlation coefficients. The correlation coefficient between earnings and cash flow, between earnings and accruals and between cash flow from operations and accruals are 0.93, 0.41 and 0.04, respectively.

Table 2: Pearson correlation coefficient

	EA	CFO
CFO	0.93 (0.00)*	
ACC	0.41 (0.00)*	0.04 (0.04)**

*, ** Significant at 0.01 and 0.05 level, respectively.
Reported numbers are correlation coefficients (P-value).

This paper implements three different types of panel unit root tests: the Lin et al. (2002) test (LLC), the Fisher-type ADF and Phillips–Perron (PP) tests. Results are based on the inclusion of an individual intercept and no trend and intercept. The results of panel unit root tests in level data are reported in Table 3.

It is clear that earnings, CFO and accruals are stationary over time and thus, We think that the assumption of stationarity in earnings, CFO and accruals could be sustainable under my analyses (especially in the case of one-year horizon used here).

Table 3: Results of panel unit root test

	EA	CFO	ACC
Series in level (No trend and intercept)			
Lin et.al	-36.97 (0.00)*	-25.69 (0.00)*	-315.50 (0.00)*
ADF-Fisher	1525.25 (0.00)*	1409.95 (0.00)*	1070.72 (0.00)*
PP-Fisher	1683.32 (0.00)*	1498.12 (0.00)*	1073.43 (0.00)*
Series in level (Individual intercept)			
Levin et.al	-35.09 (0.00)*	-2.78 (0.00)**	-3.86 (0.00)*
ADF-Fisher	821.98 (0.00)*	802.94 (0.00)*	492.90 (0.94)
PP-Fisher	1059.61 (0.00)*	1004.50 (0.00)*	527.63 (0.77)

* Significant at 0.05 level
Reported numbers are the statistics (P-value) for panel unit root tests.

4.2. Results for One- Year Predictive Horizon

Table 4 presents the persistence coefficients and adjusted R^2 of regressions of earnings on lagged earnings. As discussed above, these results provide evidence about the economic and statistical significance of the hypothesized negative relation between earnings volatility and earnings persistence. While the persistence coefficients and the adjusted R^2s are clearly related in these regressions, they also differ because the conditioning variables often provide for systematic differences between the variability of current and previous earnings. Baseline results for the full sample in Panel A reveal a persistence coefficient of 0.61 (significant at 0.01 level) and adjusted R^2 of 0.22, in line with existing results for this specification.

Panel B of Table 4 presents the results for quintiles formed on volatility of earnings. An examination of Panel B reveals that there is a strong and monotonic relation between volatility of earnings and earnings persistence. The persistence coefficient declines from 0.86 in quartile 1 to 0.53 in quartile 4 and the adjusted R^2 declines from 0.75 in quartile 1 to 0.23 in quartile 4. These declines seem large in absolute magnitude and suggest that conditioning on earnings volatility is economically important.

Panel B also provides tests of the statistical significance of these differences, specifically the differences for persistence and adjusted R^2 between consecutive quartiles and between quartiles 1 and 4. Testing for difference in adjusted R^2 is problematic because it involves comparing adjusted R^2 across two essentially different regressions. Although the dependent variable looks the same (current earnings), traditional tests like the Vuong's (1989) Z test are inappropriate because the variation of the dependent variable is quite different across earnings volatility quintiles. Instead, this paper uses a test based on simulating the empirical distribution of the adjusted R^2s in quartiles, suggested by Ohtani (2000). To test for difference in persistence coefficient, this paper uses a similar test based on simulating the empirical distribution of the persistence coefficients in quartiles. See Ohtani (2000) for a complete discussion of the bootstrap procedure. This paper repeats the procedure 1000 times; yielding 1000-observations of (persistence coefficients) adjusted R^2s. The tests that compare adjusted R^2s (persistence coefficients) from two different quartiles i and j are based on the following Z-statistics:

$$Z_{adj\cdot R}{}^2 = [R^2{}_{Quartile(i)} - R^2{}_{Quartile(j)}] / \sqrt{[var(R^2{}_{EP-Quartile(i)}) + var(R^2{}_{EP-Quartile(j)}]} \quad (10)$$

$$Z_{\beta} = [\beta_{Quartile(i)} - \beta_{Quartile(j)}] / \sqrt{[var(\beta_{EP-Quartile(i)}) + var(\beta_{EP-Quartile(j)}]} \quad (11)$$

Table 4: Results for regression $EA_t = \alpha + \beta EA_{t-1} + \varepsilon_t$

	β (P-value)		**Adj.R^2**	
Panel A: Regression results for full sample	0.61 (0.00)*		0.22	
Panel B: Regression results by quartiles of earnings volatility				
Quartiles by volatility of earnings	*β* (P-value)	Z_{β} (P-value)	Adj.R^2	$Z_{adj.R}{}^2$ (P-value)
Quartile 1	0.86 (0.00)*		0.75	
		2.54 (0.01)**		42.97 (0.00)*
Quartile 2	0.85 (0.00) *		0.70	
		65.60 (0.00)*		88.88 (0.00)*
Quartile 3	0.76 (0.00) *		0.57	
		63.85 (0.00)*		104.42 (0.00)*
Quartile 4	0.53 (0.00) *		0.23	
Difference (Quintile1–Quintile4)	0.33	91.47 (0.00)*	0.52	167.31 (0.00)*
Panel C: Regression results by quartiles of CFO volatility				
Quartiles by volatility of CFO				
Quartile 1	0.82 (0.00)*		0.67	
		6.49 (0.00)*		18.99 (0.00)*
Quartile 2	0.81 (0.00)*		0.64	
		34.05 (0.00)*		39.97 (0.00)*
Quartile 3	0.75 (0.00)*		0.50	
		58.13 (0.00)*		59.97 (0.00)*
Quartile 4	0.53 (0.00)*		0.24	
Difference (Quintile1–Quintile4)	0.29	76.88 (0.00)*	0.43	122.60 (0.00)*
Panel D: Regression results by quartiles of accruals volatility				
Quartiles by volatility of (|accruals|)				
Quartile 1	0.68 (0.00)*		0.59	
		9.67 (0.00)*		22.21 (0.00)*
Quartile 2	0.65 (0.00)*		0.51	
		5.73 (0.00)*		8.52 (0.00)*
Quartile 3	0.63 (0.00)*		0.48	
		-0.99 (0.32)		0.11 (0.91)
Quartile 4	0.63 (0.00)*		0.48	
Difference (Quintile1–Quintile4)	0.05	11.98 (0.00)*	0.11	26.43 (0.00)*
Panel E: Regression results by quartiles of absolute amount of accruals				
Quartiles by |accruals|				
Quartile 1	0.77 (0.00)*		0.35	
		30.75 (0.00)*		5.25 (0.00)*
Quartile 2	0.63 (0.00)*		0.33	
		12.75 (0.00)*		12.13 (0.00)*
Quartile 3	0.56 (0.00)*		0.02	

Quartile 4	0.10 (0.08)	86.31 (0.00)*	0.00	86.31 (0.00)*
Difference (Quintile1–Quintile4)	0.67	149.80 (0.00)*	0.35	90.20 (0.00)*

*, ** Significant at 0.01 and 0.05 level, respectively.
The tests that compare adjusted R^2s (persistence coefficients) from two different quartiles i and j are based on the following Z-statistics:

$$z_{adj.R^2} = \left[R^2_{Quartile\,(i)} - R^2_{Quartile\,(j)}\right] / \sqrt{[var(R^2_{EP-Quartile(i)}) + var(R^2_{EP-Quartile(j)})]}$$

$$z_\beta = \left[\beta_{Quartile(i)} - \beta_{Quartile(j)}\right] / \sqrt{var(\beta_{EP-Quartile(i)} + var(\beta_{EP-Quartile(i)})]}$$

where $R^2_{Quartite\,(i)}$ ($\beta_{Quartite(i)}$) is the adjusted R^2 (persistence coefficient) of regression (1) in quartile i and $var(R^2_{EP-Quartite(i)})$ ($var(\beta_{EP-Quartile(i)})$) is the variance of adjusted R^2s (persistence coefficients) from bootstrap procedure $Z_{adjR}{}^2$ Z_β is the test statistic to examine the significance of difference between adjusted R^2 (persistence coefficients) in quartile i and quartile j. Under the null hypothesis of no difference between both adjusted R^2s (persistence coefficients), these Z-statistics are approximately standard normal in large samples.

EA is earnings and defined as net income and deflated by lagged total assets. CFO is defined as cash from operating activities in three categories cash flow statement based on Iranian accounting standard#2 and deflated by lagged total assets. ACC is accruals and is calculated as the difference between EA and CFO. VOL(EA) is defined as the firm-specific volatility of earnings, which is calculated as the standard deviation of EA over the research period. VOL(CFO) is defined as the firm-specific volatility of cash from operations, which is calculated as the standard deviation of CFO over the research period. VOL ($|ACC|$) is defined as the firm-specific volatility of accruals, which is calculated as the standard deviation of absolute amount of accruals over the research period.
where $R^2_{Quartite\,(i)}$ ($\beta_{Quartite(i)}$) is the adjusted R^2 (persistence coefficient) of regression (1) in quartile i and $var(R^2_{EP-Quartite(i)})$ ($var(\beta_{EP-Quartile(i)})$) is the variance of adjusted R^2s (persistence coefficients) from bootstrap procedure $Z_{adjR}{}^2$ Z_β is the test statistic to examine the significance of difference between adjusted R^2 (persistence coefficients) in quartile i and quartile j. Under the null hypothesis of no difference between both adjusted R^2s (persistence coefficients), these Z-statistics are approximately standard normal in large samples. One caveat of the tests is that they assume that both samples are independent.

I think that this assumption could be sustainable under my analysis. In this case, the null hypothesis is that earnings volatility is unrelated to earnings (persistence) predictability.

The test statistics (Z_β) for difference in persistence coefficients of quartiles 1 and 2 is 2.54, quartiles 2 and 3 is 65.60 and quartiles 3 and 4 is 63.85. The test statistics for difference in persistence coefficients of quartiles 1 and 4 is 91.47. Also, test statistics ($Z_{adj.R}{}^2$) for difference in adjusted R^2s of quartiles 1 and 2 is 42.97, quartiles 2 and 3 is 88.88 and quartiles 3 and 4 is 104.42. The test statistics for difference in adjusted R^2s of quartiles 1 and 4 is 167.31. Results robustly reject the null hypothesis of no differences between both adjusted R^2s (persistence coefficients). Therefore, while earnings volatility increases across quartiles, persistence coefficients and adjusted R^2s (proxy for earnings predictability) significantly decline and this paper conclude that there is a negative relation between earnings volatility and earnings predictability.

Panel C presents results for one more conditioning variable, volatility of cash flows, which serves as a proxy for economic volatility. Recall that Section 2 suggests that one advantage of the earnings volatility variable is that it combines the explanatory power of both economic volatility and accounting problems-based volatility with respect to earnings predictability. If this conjecture is true, this paper expects that earnings volatility has higher explanatory power than cash flow volatility with respect to earnings predictability. An examination of Panel C reveals that volatility of cash flows provides a good ranking on earnings predictability, with range in persistence of 0.29 and range in adjusted R^2 of 0.43. However, the ranges in persistence and adjusted R^2 for the earnings volatility variable in Panel B are more than those in Panel C and the across-panel differences in persistence and adjusted R^2 have highly significant p-values. Thus, the results in Panel C suggest that earnings volatility dominates cash flow volatility with respect to earnings predictability. Having in mind that the volatility of cash flows is similar in magnitude to the volatility of earnings (see Table 4, Panel B), this result implies that the volatility in earnings due to the accounting process is important in relation to earnings predictability. Therefore, while volatility of cash from operations increases across quartiles, persistence coefficients and adjusted R^2s (proxy for earnings predictability) significantly decline and this paper conclude that there is a negative relation between cash from operations volatility and earnings predictability.

In panel D, this paper ranks the quartiles base on volatility of absolute accruals and run regression (1) and related tests. Except for difference between persistent coefficients (adjusted R^2s) of quartiles 3 and 4, remain results are similar to results of panel A and B. The test statistic for difference in persistence coefficients (adjusted R^2s) across quartiles 1 and 4 is 11.98 (26.43). Thus, results provide enough evidence to reject the null hypothesis of no differences between both adjusted R^2s (persistence coefficients).

Table 5: Results for regression $EA_t = a + \beta_1 CFO_{t-1} + \beta_2 ACC_{t-1} + \varepsilon_t$

	β_1 (P-value)	**β_2(P-value)**	**Adj.R^2**	
Panel A: Regression results for full sample	0.58 (0.00)*	0.85 (0.00)*	0.23	
Panel B: Regression results by quartiles of earnings volatility				
Quartiles by volatility of earnings	β_1 (P-value)	β_2 (P-value)	Adj.R^2	$Z_{adj.R}{}^2$ (P-value)
Quartile 1	0.89 (0.00)*	0.56 (0.00)*	0.75	
				43.18 (0.00)*
Quartile 2	0.89 (0.00)*	0.53 (0.02)**	0.70	
				89.37 (0.00)*
Quartile 3	0.82 (0.00)*	0.25 (0.34)	0.57	
				104.16 (0.00)*
Quartile 4	0.52 (0.00)*	0.62 (0.33)	0.22	
Difference (Quintile1–Quintile4)			0.53	164.43 (0.00)*
Panel C: Regression results by quartiles of CFO volatility				
Quartiles by volatility of CFO				
Quartile 1	0.88 (0.00)*	0.42 (0.06)	0.67	
				16.92 (0.00)*
Quartile 2	0.87 (0.00)*	0.21 (0.38)	0.64	
				43.75 (0.00)*
Quartile 3	0.78 (0.00)*	0.54 (0.06)	0.50	
				61.76 (0.00)*
Quartile 4	0.54 (0.00)*	0.20 (0.76)	0.24	
Difference (Quintile1–Quintile4)			0.43	123.68 (0.00)*
Panel D: Regression results by quartiles of accruals volatility				
Quartiles by volatility of |accruals|				
Quartile 1	0.65 (0.00)*	1.96 (0.00)*	0.60	
				22.92 (0.00)*
Quartile 2	0.60 (0.00)*	1.07 (0.00)*	0.51	
				8.67 (0.00)*
Quartile 3	0.58 (0.00)*	1.01 (0.00)*	0.48	
				-2.21 (0.02)**
Quartile 4	0.71 (0.00)*	-0.28 (0.40)	0.49	
Difference (Quintile1–Quintile4)			0.11	25.18 (0.00)*
Panel E: Regression results by quartiles of absolute amount of accruals				
Quartiles by |accruals|				
Quartile 1	0.76 (0.00)*	184.34 (0.46)	0.35	
				5.18 (0.00)*

Quartile 2	0.62 (0.00)*	1.75 (0.21)	0.33	
				81.09 (0.00)*
Quartile 3	0.44 (0.02)**	5.09 (0.02)**	0.03	
				4.62 (0.00)*
Quartile 4	0.01 (0.90)	1.30 (0.03)**	0.02	
Difference (Quintile1–Quintile4)			0.33	86.37 (0.00)*

*, ** Significant at 0.01 and 0.05 level, respectively.
The tests that compare adjusted R^2s (persistence coefficients) from two different quartiles i and j are based on the following Z-statistics:

$$Z_{adj \cdot R}{}^2 = [R^2{}_{Quartile(i)} - R^2{}_{Quartile(j)}] / \sqrt{[var(R^2{}_{EP-Quartile(i)}) + var(R^2{}_{EP-Quartile(j)}]}$$

$$Z_\beta = [\beta_{Quartile(i)} - \beta_{Quartile(j)}] / \sqrt{[var(\beta_{EP-Quartile(i)}) + var(\beta_{EP-Quartile(j)}]}$$

where $R^2_{Quartite\,(i)}$ $((\beta_{Quartite(i)}))$ is the adjusted R^2 (persistence coefficient) of regression (1) in quartile i and $var(R^2_{EP-Quartite(i)})$ $(var(\beta_{EP-Quartile(i)}))$ is the variance of adjusted R^2s (persistence coefficients) from bootstrap procedure $Z_{adjR}{}^2$ (Z_β) is the test statistic to examine the significance of difference between adjusted R^2 (persistence coefficients) in quartile i and quartile j. Under the null hypothesis of no difference between both adjusted R^2s (persistence coefficients), these Z-statistics are approximately standard normal in large samples.

EA is earnings and defined as net income and deflated by lagged total assets. CFO is defined as cash from operating activities in three categories cash flow statement based on Iranian accounting standard#2 and deflated by lagged total assets. ACC is accruals and is calculated as the difference between EA and CFO. VOL(EA) is defined as the firm-specific volatility of earnings, which is calculated as the standard deviation of EA over the research period. VOL(CFO) is defined as the firm-specific volatility of cash from operations, which is calculated as the standard deviation of CFO over the research period. VOL(|ACC|) is defined as the firm-specific volatility of accruals, which is calculated as the standard deviation of absolute amount of accruals over the research period.

Therefore, while volatility of accruals increases across quartiles, persistence coefficients and adjusted R^2s (proxy for earnings predictability) significantly decline and this paper conclude that there is a negative relation between accruals volatility and earnings predictability.

Panel E illustrates the Sloan (1996) result in the sample by conditioning on level of absolute accruals. Since Sloan (1996) shows that extreme accruals are less persistent, this paper expects that the persistence of earnings is lower in quartile 4. Indeed, the persistence of earnings for quartile 4 is about 0.10, much lower than the 0.77–0.56 range for the rest of the accrual quartiles. R^2 for quartile 5 is also lower, and both the persistence and the R^2 differences across extreme quartiles are statistically significant.

Turning to a comparison of the results across Panels B and D, this paper finds that the decline in persistence across earnings volatility quartiles (0.33) is moderately lower than the decline for the accrual quartiles (0.67).The inverse pattern of results is observed for R^2 but the decline in R^2 across earnings volatility quartiles (0.52) is much larger than the corresponding decline for the accrual quartiles (0.35). The test statistic for difference in persistence coefficients (adjusted R^2s) across quartiles 1 and 4 is 149.80 (90.20) and this paper conclude that there is a negative relation between accruals volatility and earnings predictability. Overall, the results of Table 4 provide enough evidences that earnings and its components volatility are negatively related to earnings predictability.

In Table 5, this paper presents the results of regression (2) in full sample and in quartiles that are ranked by volatility of earnings (panel B), volatility of cash from operations (panel C), volatility of absolute accruals (panel D) and absolute amount of accruals (panel E). Baseline results for the full sample in Panel A reveal coefficient of lagged CFO 0.58 and coefficient of lagged accruals 0.85 (both significant at 0.01 level) and adjusted R^2 of 0.23, in line with existing results for this specification.

In panel B, C, D and E, the differences between adjusted R^2s in quartile 1 and 4 are 0.53, 0.43, 0.11 and 0.33, and the test statistics for difference between adjusted R^2s in quartile 1 and 4 are 164.43, 123.68, 25.18 and 86.37, respectively. This paper expects that earnings volatility has higher explanatory power than cash flow volatility with respect to earnings predictability. An examination of Panel B reveals that volatility of cash flows provides a good ranking on earnings predictability, with range in adjusted R^2 of 0.43 vs. 0.53 in panel B Thus, the results in Panel C suggest that earnings volatility dominates cash flow volatility with respect to earnings predictability.

Therefore, while volatility of earnings and its components increases across quartiles, adjusted R^2s (proxy for earnings predictability) significantly decline and the role of lagged earnings components to predicting current earnings be weakened.

4.3. Results for Five- Year Predictive Horizon

Table 6 presents results for 5-year prediction of earnings, conditional on earnings volatility. Benchmark results for the full sample are presented in Panel A, comprising unconditional regressions of current earnings on various-horizon previous earnings. An examination of Panel A reveals that the predictive power of earnings quickly deteriorates for longer prediction horizons (except for year t-4), consistent with existing results. The persistence coefficient on earnings drops from 0.60 in year t-1 to 0.37 in year t-5 and adjusted R^2 drops from 0.31 in year t-1 to 0.09 in year t-5.

In investigating the effect of earnings volatility, for parsimony this paper focuses the presentation on the extreme quartiles. Panel B in Table 6 presents the results for firm-years in the lowest quartile of earnings volatility and Panel C presents the results for the highest quartile of earnings volatility. Even a cursory examination of these two panels reveals dramatic differences in the long-run predictive characteristics of the underlying samples

The results for low-volatility firms in Panel B reveal a robust predictive power over the entire 5-year horizon. The persistence coefficient is high in year t-1 (0.86) and deteriorates only modestly to 0.71 in year t-5. The erosion in R^2 is more substantial (0.75–0.58) but in terms of absolute magnitude even for year t-5 one retains a considerable amount of confidence in the prediction of earnings. In fact, a literal reading of these numbers implies that it is easier to predict earnings 5 years ahead for low-volatility firms than to predict earnings 1 year ahead for high volatility or even all firms. The combined pattern of these results suggests that earnings volatility has a remarkable differentiating power in the long-run prediction of earnings.

Table 6: The implication of earnings volatility for long-term earnings

	β		**Adj. R^2**		**Number of observations**	
Panel A: Regression results for the full sample						
$EA_t=a+\beta EA_{t-1}+\varepsilon_t$	0.60 (0.00)*		0.31		1518	
$EA_t=a+\beta EA_{t-1}+\varepsilon_t$	0.44 (0.00)*		0.21		1118	
$EA_t=a+\beta EA_{t-1}+\varepsilon_t$	0.36 (0.00)*		0.15		854	
$EA_t=a+\beta EA_{t-1}+\varepsilon_t$	0.49 (0.00)*		0.18		585	
$EA_t=a+\beta EA_{t-1}+\varepsilon_t$	0.37 (0.00)*		0.09		285	
Panel B: Regression results for the lowest earnings volatility quartiles						
$EA_t=a+\beta EA_{t-1}+\varepsilon_t$	0.86 (0.00)*		0.75		384	
$EA_t=a+\beta EA_{t-1}+\varepsilon_t$	0.81 (0.00)*		0.68		287	
$EA_t=a+\beta EA_{t-1}+\varepsilon_t$	0.79 (0.00)*		0.64		210	
$EA_t=a+\beta EA_{t-1}+\varepsilon_t$	0.77 (0.00)*		0.64		142	
$EA_t=a+\beta EA_{t-1}+\varepsilon_t$	0.71 (0.00)*		0.58		68	
Panel C: Regression results for the highest earnings volatility quartiles						
$EA_t=a+\beta EA_{t-1}+\varepsilon_t$	0.52 (0.06)		0.01		366	
$EA_t=a+\beta EA_{t-1}+\varepsilon_t$	0.41 (0.00)*		0.03		264	
$EA_t=a+\beta EA_{t-1}+\varepsilon_t$	0.29 (0.00)*		0.10		200	
$EA_t=a+\beta EA_{t-1}+\varepsilon_t$	0.01 (0.85)		-0.01		142	

$EA_t=a+\beta EA_{t-1}+\varepsilon_t$	0.12 (0.89)		-0.01		71	

Table 6: The implication of earnings volatility for long-term earnings - continued

Panel D: Regression results for the full sample						
$EA_t=a+\beta_1 CFO_{t-1}+\beta_1 ACC_{t-1}+\varepsilon_t$	0.59 (0.00)*	0.72 (0.00)*		0.31		1518
$EA_t=a+\beta_1 CFO_{t-1}+\beta_1 ACC_{t-1}+\varepsilon_t$	0.43 (0.00)*	0.51 (0.04)**		0.21		1118
$EA_t=a+\beta_1 CFO_{t-1}+\beta_1 ACC_{t-1}+\varepsilon_t$	0.41 (0.00)*	-0.13 (0.62)		0.15		854
$EA_t=a+\beta_1 CFO_{t-1}+\beta_1 ACC_{t-1}+\varepsilon_t$	0.56 (0.00)*	-0.19 (0.60)		0.18		585
$EA_t=a+\beta_1 CFO_{t-1}+\beta_1 ACC_{t-1}+\varepsilon_t$	0.55 (0.00)*	-0.83 (0.15)		0.10		285
Panel E: Regression results for the lowest earnings volatility quartiles						
$EA_t=a+\beta_1 CFO_{t-1}+\beta_1 ACC_{t-1}+\varepsilon_t$	0.89 (0.00)*	0.56 (0.00)*		0.75		384
$EA_t=a+\beta_1 CFO_{t-1}+\beta_1 ACC_{t-1}+\varepsilon_t$	0.81 (0.00)*	0.79 (0.00)*		0.68		287
$EA_t=a+\beta_1 CFO_{t-1}+\beta_1 ACC_{t-1}+\varepsilon_t$	0.82 (0.00)*	0.56 (0.03)**		0.64		210
$EA_t=a+\beta_1 CFO_{t-1}+\beta_1 ACC_{t-1}+\varepsilon_t$	0.86 (0.00)*	0.18 (0.57)		0.65		142
$EA_t=a+\beta_1 CFO_{t-1}+\beta_1 ACC_{t-1}+\varepsilon_t$	0.82 (0.00)*	-0.05 (0.91)		0.59		68
Panel F: Regression results for the highest earnings volatility quartiles						
$EA_t=a+\beta_1 CFO_{t-1}+\beta_1 ACC_{t-1}+\varepsilon_t$	0.60 (0.08)	-0.84 (0.81)		0.01		366
$EA_t=a+\beta_1 CFO_{t-1}+\beta_1 ACC_{t-1}+\varepsilon_t$	0.48 (0.00)*	-0.54 (0.74)		0.02		264
$EA_t=a+\beta_1 CFO_{t-1}+\beta_1 ACC_{t-1}+\varepsilon_t$	0.34 (0.00)*	-0.25 (0.69)		0.09		200
$EA_t=a+\beta_1 CFO_{t-1}+\beta_1 ACC_{t-1}+\varepsilon_t$	0.00 (0.98)	6.02 (0.00)*		0.06		142
$EA_t=a+\beta_1 CFO_{t-1}+\beta_1 ACC_{t-1}+\varepsilon_t$	0.58 (0.67)	-2.80 (0.71)		-0.03		71

*, ** Significant at 0.01 and 0.05 level, respectively

EA is earnings and defined as net income and deflated by lagged total assets. CFO is defined as cash from operating activities in three categories cash flow statement based on Iranian accounting standard#2 and deflated by lagged total assets. ACC is accruals and is calculated as the difference between EA and CFO EA_t is current year earnings, EA_{t-1} is one-year lagged earnings, and so on. CFO_{t-1} and ACC_{t-1} are one-year lagged cash from operations and accruals, respectively and so on.

High-volatility firm results in Panel C show a quick deterioration of persistence (0.52–0.12) over the 5-year predictive horizon, where at all time horizons the numbers in Panel C are lower than those in Panel A but, the trend of adjusted R^2s across quartiles is erratic

In panel D, E and F, this paper provides the regression results of current earnings on previous its components over the 5-year horizon for full, lowest earnings volatility and highest earnings volatility sample. Results of panel D, E and F are similar to A, B and C, respectively.

In panel D, adjusted R^2 drops from 0.31 in year t-1 to 0.10 in year t-5 and in panel E, adjusted R^2 drops from 0.89 in year t-1 to 0.82 in year t-5 but, the trend of adjusted R^2s across quartiles in Panel F is erratic.

Overall, results from Table 6 show that while predictive horizon increase from 1-year to 5-year, earnings predictability decrease gradually.

5. Conclusion

Survey evidence indicates widely held managerial beliefs that earnings and its components volatility are negatively related to earnings predictability. In addition, existing research suggests that earnings volatility is determined by economic and accounting factors, and both of these factors reduce earnings predictability.

This paper finds that, earnings, cash from operations and accruals volatility and earnings persistence are negatively related to earnings predictability. Also, results show that while volatility of earnings, cash from operations and accruals increases the role of cash from operations and accruals in predicting future earnings declines.

Finally, results show that, while predictive horizon increases, earnings predictability decreases.

1) A stochastic process y_t is weakly stationary or covariance stationary if it satisfies the following requirements:
   1. $E[y_t]$ is independent of t,
   2. $var[y_t]$ is a finite, positive constant, independent of t and
   3. $Cov[y_t,y_s]$ is a finite function of $|t-s|$, but not for t or s (Green, 2003, p. 612).

Existing research show that the volatility of earnings (and consequently cash from operations and accruals) has approximately doubled over the last 40 years, see Givoly and Hayn (2000) and Dichev and Tang (2008). However, the stationarity argument holds reasonably well for the one-year horizon used here. This paper also examines the stationarity of earnings, CFO and accruals by panel unit root tests.

References

[1] Abarbanell, J. Bushee, B. (1997), “Fundamental analysis, future earnings, and stock prices”, *Journal of Accounting Research*, Vol. 25, pp. 1–24.

[2] Barberis, N. Shleifer, A. Vishny, R. (1998), “A model of investor sentiment”, *Journal of Financial Economics*, Vol. 49, pp. 307–343.

[3] Brown, L.D. (1993), “Earnings forecasting research: its implications for capital markets research”, *International Journal of Forecasting*, Vol. 9, pp. 295–320.

[4] Crabtree, A. Maher, J. (2005), “Earnings Predictability, Bond Ratings, and Bond Yields”, *Review of Quantitative Finance and Accounting*, Vol. 25 No. 3, pp. 233-253.

[5] Daniel, K. Hirshleifer, D. Subramanyam, A. (1998), “Investor psychology and security market under- and overreactions”, *Journal of Finance*, Vol. 53, pp. 1839–1885.

[6] Das, S. Levine, C. Sivaramakrishnan, K. (1998), “Earnings predictability and bias in analysts’ earnings forecasts”, *The Accounting Review*, Vol. 73, pp. 277–294

[7] Dechow, P. Dichev, I.D. (2002), “The quality of accruals and earnings: the role of accrual estimation errors”, *The Accounting Review*, Vol. 77 (Supplement), pp. 35–59.

[8] Dichev, I.D. Tang, V.W. (2008), “Matching and the changing properties of accounting earnings over the last 40 years”, *The Accounting Review*, Vol. 83, pp. 1–36.

[9] Dichev, I.D. Tang, V.W. (2009), “Earnings volatility and earnings predictability”, *Journal of Accounting and Economics* Vol. 47, pp. 160-181.

[10] Eames, M. Glover S. (2003), “Earnings predictability and the direction of analysts’ earnings forecast errors”, *The Accounting Review*, Vol. 78 No. 3, pp. 707-724.

[11] Edwards, E. Bell, P. (1961), *The Theory and Measurement of Business Income*, University of California Press, Berkeley, CA.

[12] Fama, E. Miller, M. (1972), *The Theory of Finance*, Dryden Press, Hinsdale, IL.

[13] Feltham, G. Ohlson, J. (1995), “Valuation and clean surplus accounting for operating and financial activities”, *Contemporary Accounting Research*, Vol. 11, pp. 689–731.

[14] Foster, G. (1977), “Quarterly accounting data: time-series properties and predictive-ability results”, *The Accounting Review*, Vol. 52, pp. 1–21.

[15] Givoly, D. Hayn, C. (2000), “The changing time-series properties of earnings, cash flows and accruals: has financial reporting become more conservative”, *Journal of Accounting and Economics*, Vol. 29, pp. 287–320.

[16] Graham, J. Campbell, H. Rajgopal, S. (2005), “The economic implications of corporate financial reporting”, *Journal of Accounting and Economics*, Vol. 40, pp. 3–73.

[17] Green, W.H. (2003), *Econometric Analysis*, Prentice Hall, 5 ed.

[18] Healy, P. Palepu, K. (2001), “A review of the voluntary disclosure literature”, *Journal of Accounting and Economics*, Vol. 31, pp. 405–440.
[19] Hong, H. Stein, J. (1999), “A unified theory of under reaction, momentum trading, and overreaction in asset markets”, *Journal of Finance*, Vol. 54, pp. 2143–2184.
[20] Kothari, S.P. (2001), “Capital markets research in Accounting”, *Journal of Accounting and Economics*, Vol. 31, pp. 105-231.
[21] Lev, B. Thiagarajan, R.S. (1993), “Fundamental information analysis”, *Journal of Accounting Research*, Vol. 31 No. 2, pp. 190–215.
[22] Lin, C. Levin, A. and Chu, C. (2002), “Unit root tests in panel data: asymptotic and finite-sample properties”, *Journal of Econometrics*, Vol. 108 No. 1, pp. 1–24.
[23] Lipe, R. (1990), “The relation between stock returns and accounting earnings given alternative information”, *The Accounting Review*, Vol. 65 No. 1, pp. 49–71.
[24] Ohlson, J. (1995), “Earnings, book values, and dividends in equity valuation”, *Contemporary Accounting Research*, Vol. 11, pp. 661–687.
[25] Ohtani, K. (2000), “Bootstrapping R^2 and adjusted R^2 in regression analysis”, *Economic Modelling*, Vol. 17, pp. 473-483.
[26] Schipper, K. (1991), “Commentary on analysts’ forecasts”, *Accounting Horizons*, Vol. 5, pp. 105–121.
[27] 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.
[28] Voung, Q. (1989), “Likelihood ratio tests for model selection and non-nested hypotheses”, *Econometrica*, Vol. 57, pp. 307–333.
[29] Watts, R. Zimmerman, J. (1986), *Positive Accounting Theory*, Prentice-Hall, Englewood Cliffs, NJ.