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RESEARCH ARTICLE

The analysis of the relationship between stock returns in an uncertain investment environment and income smoothing

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Abstract

Present paper aimed to analyze the relationship between unreliable investment environments of stock returns and income smoothing among the companies listed by Tehran Stock Exchange Organization. Available data was processed by MS Excel software and also time series and also mixed regression (for auto-correlation removal) and cross-sectional (panel data) data combination methods were employed to test hypothesis. The result indicates that the direct and significant relationship between stock returns and income smoothing gives rise to improve financial performance within companies listed by Tehran Stock Exchange Organization, but in sale variability conditions, forecast deviation relative to real interest is relatively better.

Introduction

Investment rate in any company follows a set of variables among which 'investment security' is one of the most important ones. Studying security rate in an economy and combination of investment environment insecurity factors are possible by two methods. First, which ensures an objective approach to security issue, focuses on weaknesses of security institutions inside the country. Second one ensures subjective approach to security issue where security rate in a country as well as anti-security factors and impact of each of them on business environment insecurity are inquired from real applicant of security namely investors- either actual or potential.

While making decision for investment, capital owner needs to be confident from two aspects: first, confidence of reasonable return through the project which is financed by his/her capital; confidence of lack of political, military, legal, and cultural and so on conflicts on his/her capital which is already in construction and machinery form. Behavior of domestic and foreign capitalist is the best indicator and shows rate of investment security and return. Lack of enthusiasm among capital owners to invest in a specific country or industry indicates their conclusion from the components which form both investment return and security.

Insecure investment environment or environmental uncertainties which have been reported in profit variability emphasize on information asymmetry between managers and external investors. Managers work in an insecure environment and thereby they try to reduce such a variability using income smoothing techniques. Here, Tehran Stock Exchange Organization answer to income smoothing in insecure environment conditions has been analyzed among the companies listed by the mentioned organization.

Literature review

Sanyal and Bulan (2011) analyzed risk, market uncertainties and financial options of American electrical companies. Given their results, the policies encouraging competition and increasing environmental uncertainties, reduce debt/equity ratio.

Ghosh and Olsen (2009) studied the relationship between environmental uncertainties and discretionary accruals. The results indicate that managers use discretionary accruals to reduce variability and fluctuation in reports of Interest; particularly in case of higher environmental unsecure conditions, discretionary accruals are more useful.

Baum et al (2006) analyzed impact of macroeconomic uncertainties on liquidity of nonfinancial corporations and by an experimental study investigated whether unreliability in macroeconomic conditions are effective on liquidity participation of nonfinancial corporations or not. Given the results, the lower macroeconomic uncertainties with stable conditions, the better liquidity conditions.

Tucker and Zarowin (2006) argue that environmental uncertainty gives rise to change reported earnings of the organization and emphasizes on Asymmetric Information between managers and shareholders. Managers working in an environment with high certainty are motivated to adjust such changes by income numbers. They investigate commodities market reaction on income smoothing for companies operating in an environment filled with uncertainties.

Ehsan Habib et al (2011) studied widely market reaction against income smoothing for companies operating in variable and unorganized space. Income smoothing is a specific instance of income management where managers try to adjust and smooth quite variable and temporary items in reported earnings in order to present a stable flow. Moreover, the companies operating in environmental uncertainty conditions are confronted with asymmetric information.

Hosseinzadeh and Bahraini (2004) analyzed effective factors on investment security in Iran. This work is based on a logic that to do investment on a specific country or industry, 'security feeling' is important and worthy for investment applicants.

Ansari and Khajavi (2011) studied the relationship between income smoothing and the market price of stocks and financial ratios. In this work, income smoothing rate of companies listed in Tehran Stock Exchange was measured using negative correlation between changes in discretionary accruals and pre-determined profits.

Rahmani and Bashiri (2011) studied impact of income smoothing on informing stock price. The corporate managers try to reduce profitability fluctuations through income smoothing in order to increase investors' confidence and meet their expectations. Regarding management motivations for income smoothing, there are two hypotheses: first, to distort the information for their own benefit and second, to transfer and report their confidential information about future profits. In this work, usefulness of income smoothing through impact on stock prices informing about the company's future performance was studied. Base model to test research hypotheses is Zarowin's (2002) model and income smoothing has been measured according to two negative correlation criteria between changes in accruals and cash flows and interest standard deviation/flow cashes ration for 140 companies listed by Tehran Stock Exchange Organization for duration from 2003 to 2007.

Research variables

Variable is composed of a characterization, position or mode which can be transferred to a quantity and researcher can try to do experiment or test hypotheses by the variable control, manipulation and observation (Abbaszadeh, 2001, pp 181-183). The variables are as follows:

- Stock returns (RETt),
- Earnings per share (Xt),
- Factor of environmental instability (cv),
- Deviation amount of actual accruals (NDAP)
- Discretionary Accruals (DAP)
- Standard deviation of earnings per share (EARNSTD)
- Total Assets (ASSETS)
- Total Accruals (ACCRUALS)
- Changes in sale (ΔSALES)
- Changes in expected profits (Corr(ΔDAP,ΔPDI))
- Assets as Machinery and Equipments (PPE)
- Return on Assets (ROA)
- Ratio of book value to market value (GROWTH), and
- Expected profits (PDI).

In the following, the way to calculate each variable will be presented.

3-1- Dependent Variable

Dependent variable is the variable affected by independent ones. In other words, dependent variable is got under influence of independent variable. Dependent variables here are stock returns (RETt) and expected profits (PDI).

- Stock returns caused by dividends received (RETt)
- Expected profits by deduction of discretionary accruals from net income (PDI).

3-2- Independent Variable

Independent variable is the variable whose impact on other variables is measured by the researcher. Here, independent variables are as follows:

- Factor of environmental instability (cv),

- Deviation amount of actual accruals (NDAP)
- Discretionary Accruals (DAP)
- Standard deviation of earnings per share (EARNSTD)
- Total Assets (ASSETS)
- Total Accruals (ACCRUALS)
- Changes in sale (ΔSALES)
- Changes in expected profits (Corr(ΔDAP,ΔPDI))
- Assets as Machinery and Equipments (PPE)
- Return on Assets (ROA)
- Ratio of book value to market value (GROWTH)

Research Models

Now, three following regression models as Panel Data are used to analyze data and test hypotheses:

4-1- Tucker and Zarowin Model

In this section, conceptual model of research (Tucker and Zarowin(2006)) is explained:

The income smoothing is estimated as negative correlation between changes in discretionary accruals of a company (Δ*DAP*) and changes in expected profits (Δ*PDI*). Jones (1991) model is used to estimate discretionary accruals:

$$ACCRUALS_t = \beta_0(1/ASSETS_{t-1}) + \beta_1 \Delta SALES_t + \beta_3 PPE_t + \beta_4 ROA_t + \varepsilon_t$$

Where:

Assets, Accruals and Δ Sales depict total assets, total accruals and changes in sale, respectively. Also, PPE and ROA stand for assets as machinery and equipments and return on assets using net profit on total capital, respectively. Changes in price are shown from the beginning of non-discretionary accruals (NDAP) with fitted values of the above equation:

$$NDAP_{j,t} = \hat{\beta}_0(1/ASSETS_{j,t-1}) + \hat{\beta}_1 \Delta SALES_{j,t} + \hat{\beta}_3 PPE_{j,t} + \hat{\beta}_4 ROA_{j,t}$$

And, discretionary accruals (DAP) are estimated by deviation amount of actual accruals from NDAP.

PDI: expected profit is also obtained by deduction of discretionary accruals from net income:

$$PDI = NI - DAP$$

IS: The correlation between changes in discretionary accruals and changes in expected profits *Corr*(ΔDAP,ΔPDI) is in observations for current year and for three recent years. The companies with greater negative correlation are the companies with greater smoothing.

4-2- Uncertainty Models

In order to specify environmental uncertainty on income smoothing, Ordinary Least Square (OSL) regression formula is used:

$$
\begin{aligned}
RET_{i,t} = {} & \eta_0 + \eta_1 X_t + \eta_2 X_{t-1} + \eta_3 X_{t3} + \eta_4 RET_{t3} + \eta_5 IS_{,t} \\
& + \eta_6 IS_t{}^* X_t + \eta_7 IS_t{}^* X_{t-1} + \eta_8 IS_t{}^* X_{t3} + \eta_9 IS_t{}^* RET_{t3} \\
& + \eta_{10} EU_t + \eta_{11} EU_{t*} X_t + \eta_{12} EU_t{}^* X_{t-1} + \eta_{13} EU_t{}^* X_{t3} \\
& + \eta_{14} EU_t{}^* RET_{t3} + \eta_{15} EU_t{}^* IS_t + \eta_{16} EU_t{}^* IS_t{}^* X_t + \\
& \eta_{17} EU_t{}^* IS_t{}^* X_{t-1} + \eta_{18} EU_t{}^* IS_t{}^* X_{t3} \\
& + \eta_{19} EU_t{}^* IS_t{}^* RET_{t3} + \eta_{20} SIZE_{,t} + \eta_{21} GROWTH_{,t} \\
& + \eta_{22} EARNSTD_{,t} + \eta_{23} SIZE_t{}^* X_{t3} + \eta_{24} GROWTH_{,t}{}^* X_{t3} \\
& + \eta_{25} EARNSTD_{,t}{}^* X_{t3} + error
\end{aligned}
$$

Where:
RETt is Stock returns caused by dividends received; X_t and $X_{t-1}$are earnings per share for financial years t and t-1, respectively. X_{t3} is total earnings per share for financial years t1 to t3. RET_{t3} shows compound stock returns for the period of 3 years t+1 to t+3. IS_t is Pearson correlation coefficient between current year and three recent years changes DA and change in PDI $\{(\Delta DA , \Delta PDI) \rho \}$. EU_t uses two factors to include environmental instability structure: first is coefficient of sale variability (cv) which employs data for older than 3 years periods. This factor is called EU measurement factor depicted by EU_{sales}. Second is determined by absolute value of forecasts deviation proportional to real benefits. This EU measurement factor is called $EU_{dispersion}$.
Environmental instability factor is thecoefficient of sale variability (cv) which is based on market conditions. For this reason, it is a desired factor for environmental instability measurement and is calculated as follows:

Where:
cv, z and $\bar{z}$ are depicted for coefficient of sale variability, sale observations of any company and mean sale amount, respectively. This special measurement of environmental instability is calculated by historical data in a 3-year period.
Albarbanel, Lanen and Verchia (1995) present logical forecasting model which predicts high forecasted dispersion implies low precision of such a prediction which indicates higher instability of market. In addition, Baron and Stock (1998) showed that income forecast dispersion by analyzers is a useful sign of instability in any company.

$$FE_{it} = \frac{\text{actual EPS}_{it} - \text{analyst consensus forecast}_{it}}{\text{Price}_{i,t-1}}$$

Control variables:
SIZE: Natural logarithm of equity value
GROWTH: Ratio of book value to market value in year t to t-1
EARNSTD: Standard deviation of earnings per share during financial years from t+1 to t+3
S= Earnstd- Standard deviation of earnings
S= EPS- NOPM*SPS
SPS-Sale of each share
NOPM- Normal profit margin
PM- Profit Margin
PM=EPS/SPS
NOPM= $\sum \frac{PM}{3}$

Model Analysis

5-1 Descriptive Statistics Results

To study general and basic characterizations of variables for model estimation, precise analysis and studied statistical universe recognition, introduction to descriptive statistics of the variablesis necessary.

Descriptive statistics includes a set of methods to process data. The descriptive statistics of research variables are presented in below table. Descriptive statistical quantities include minimum, maximum, median, mean and Standard Deviation (SD). Considering criteria mentioned in Chapter 3 about sample selection and its impact on sample size, a total of 81 companies for duration of 2009-2011 were used here. As time series and cross sectional data (panel data) combination method is used for hypotheses test, year-company observations based on combined data were 243 observations and companies were distributed quite randomly between industries.

Descriptive statistics characterizations related to used variables in present study are briefly presented in Table (2-4). Reported statistics are composed of core indicators and criteria including mean, median as well as dispersion indicators such as variance, Standard Deviation (SD) and Quartile Deviation (QD).

Table 1: Descriptive statistics for stock returns and the independent variables

Independent Variable	Earnings per share	Stock Returns	Compound stock returns	Pearson correlation coefficient	Ratio of book value to market value	Forecast deviation	coefficient of sale variability	Natural logarithm of equity value
Median	467.8930	5.303851	1.968734	-0.151079	9.01E-06	-0.081017	0.087034	12.45611
Mean	250.0000	1.200620	1.341755	-0.218707	4.54E-06	-0.053397	0.087621	12.47900
Maximum	6142.000	134.9398	28.35030	0.998304	9.79E-05	0.230938	0.245338	16.83123
Minimum	-862.0000	-24.23294	0.422801	-0.992616	-3.10E-05	-1.178664	-0.002044	8.975883
SD	789.9067	16.37858	2.485548	0.559734	1.46E-05	0.106613	0.023252	1.235953
QD	4998.763	5972.465	37898.53	16.46768	2828.602	22440.48	904.0416	8.823771
Skewness	3.776554	3.917750	6.853733	0.354031	3.415524	-5.098924	1.143297	0.160185
Kurtosis	23.89631	25.98865	62.62525	1.939300	18.25467	48.96028	12.16840	3.876839
Probability	0.000000	0.000000	0.000000	0.000266	0.000000	0.000000	0.000000	0.012132
No of Observations	243	243	243	243	243	243	243	243

Table 1 indicates that stock returns median, mean, minimum and maximum values are 5.303851, 1.200620, -24.23294 and 134.9398, respectively. Also, earnings per share mean, median, minimum and maximum values are250.0000, 467.8930, -862.0000 and 6142.000, respectively. Compound stock returns mean, median, minimum and maximum valuesare 1.341755, 1.968734, 0.422801 and 28.35030, respectively. Furthermore, Ratio of book value to market value mean, median, minimum and maximum values are 4.54E-06, 9.01E-06, -3.10E-05 and 9.79E-05, respectively. Finally, Natural logarithms of equity value mean, median, minimum and maximum values are12.47900, 12.45611, 8.975883 and 16.83123, respectively.

5-2- Normality Test

One of the most important regression hypotheses is model's remainders normality. In order to finally estimate ultimate model of research, independent and dependent variables information were used and then ultimate regression was estimated. Models needs to be estimated then dependent variable values should be estimated per different values of independent variable. Subtracting the estimated values from actual values is the model remainders. But, before model estimation, it is possible to make sure of remainders distribution by dependent variable distribution test.

Using Kolmogorov-Smirnov Test, dependent variable normality was tested. Kolmogorov-Smirnov Test (which is named in honor of two Russian statisticians called A.N. Kolmogorov and N.V. Smirnov) is a simplified nonparametric method to specify homogeneity of experimental data with selected statistical distributions which is shown by ks.

Null hypothesis and alternative hypothesis are written as follows:

H_0 : Data follows normal distribution for dependent variable.

H_1 : Data does not follow normal distribution for dependent

Table 2: One-Sample Kolmogorov-Smirnov Test

		RETi	x1	RET 3	IS	EU sales	EU earn	Growth	Size
N		243	243	243	243	243	243	243	243
Normal Parameters[a]	Mean	5.30385114536535E0	467.89	1.96873351106750E0	-1.51078709242357E-1	.08703447636302	-8.1016819167826E-2	.0000090123262	1.24561E1
	Std. Deviation	1.63785797158 5146E1	789.907	2.48554765 2224428E0	.5597344141 39392	.023251783 504523	.1066126499 9984	.0000145 9968613	1.235953E 0
Most Extreme Differences	Absolute	.177	.185	.278	.085	.110	.190	.265	.070
	Positive	.177	.185	.242	.085	.110	.190	.239	.070
	Negative	-.144	-.168	-.278	-.073	-.090	-.180	-.265	-.061
Kolmogorov-Smirnov Z		2.757	2.883	4.341	1.318	1.708	2.963	4.136	1.091
Asymp. Sig. (2-tailed)		.000	.000	.000	.062	.006	.000	.000	.185

a. Test distribution is No

5-3- Autocorrelation test

Table 3: Autocorrelation test between variables

	Stock returns	Earnings per share	Compound returns	Correlation Coefficient	BV/MV	EU_EARN	EU_SALES	Size
Stock returns	1.000000							
Earnings per share	-0.011982	1.000000						
Compound returns	0.443328	0.111358	1.000000					
Correlation Coefficient	-0.017180	-0.002802	0.172946	1.000000				
BV/MV	0.014663	-0.162015	-0.047617	-0.009148	1.000000			
EU_EARN	0.016811	0.170480	-0.013675	0.113781	-0.146750	1.000000		
EU_SALES	0.057111	0.155440	0.063551	0.178341	-0.127830	0.052183	1.000000	
Size	-0.103527	0.060825	-0.207237	0.002277	-0.230805	0.003044	0.090003	1.000000

By a glance on above table it can be seen that correlation amounts is very low between independent variables. This indicates absence of autocorrelation between variables and is an approval on meeting one of basic regression conditions

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5-4- Hypotheses Test

5-4-1- Main Hypothesis

There is higher positive relationship between stock returns and income smoothing in uncertain conditions above investment environment (sale variability).

H_0: There is no significant relationship between stock returns and income smoothing in uncertain conditions above investment environment (sale variability) in companies listed by Tehran Stock Exchange Organization.

$H_0 : \beta i = 0$

H_1: There is a significant relationship between stock returns and income smoothing in uncertain conditions above investment environment (sale variability) in companies listed by Tehran Stock Exchange Organization.

$H_1 : \beta i \neq 0$

Table 4: Studying combined model using OLS method

Probability	Statistics-t	Standard Deviation	Coefficient	Variables
0.9821	-0.022477	0.024323	-0.000547	X1
0.0242	2.270054	0.004614	0.010475	X_1
0.0116	-2.545995	0.010638	-0.027083	X2
0.0000	9.942337	0.749785	7.454615	RET_3
0.9345	0.082238	72460.92	5959.011	GROWTH
0.0629	1.869526	3.63E-07	6.79E-07	EPS_STD_X2
0.6884	0.401502	11.20345	4.498210	C
			0.439906	Coefficient-R
			0.375380	Adjusted coefficient of determination
			1.928089	Durbin-Watson statistic
			6.817411	F-Statistics
			0.000000	Probability

As it can be seen from above table, Durbin-Watson test amount is a value from 1.5 to 2.5 which is suitable and indicates that compound stock returns has a positive relationship and this coefficient is significant, also deviation of earnings forecasts has a negative relationship and this relationship is insignificant. Corrected coefficient of determination shows that about 37 percent of changes are explained by above mentioned independent variables.

Table 4: Studying combined model using OLS method

Probability	Statistics-t	Standard Deviation	Coefficient	Variables
0.1882	1.322370	0.025649	0.033917	X1
0.0162	2.434110	0.013193	0.032113	X_1
0.0000	-4.867242	0.014636	-0.071238	X2
0.0000	9.815085	2.006024	19.68929	RET_3
0.0004	-3.654866	73.48667	-268.5839	EUS_IS
0.0029	3.031655	4.65E-07	1.41E-06	EPS_STD_X2
0.0115	-2.562975	22.78204	-58.38980	C
		Weighted statistics		
24.56558	Mean dependent var		0.997585	R-squared
224.3014	S.D. dependent var		0.995735	Adjusted R-squared
			3.007925	Durbin-Watson stat
			539.0622	F-statistic
			0.000000	Prob(F-statistic)
		Unweighted statistics		
5.303851	Mean dependent var		0.602397	R-squared
2.600583	Durbin-Watson stat		25811.75	Sum squared resid

As it can be seen from Table 5, P-Value related to Prob(F-statistic) which indicates significance of overall regression is 0.0000 and suggests that the model is significant in 99 percent confidence level. Therefore H_0 is rejected and H_1 is approved. As a result, there is a direct and significant relationship between stock returns and

income smoothing in uncertain conditions above investment environment (sale variability) in companies listed by Tehran Stock Exchange Organization.

Conclusion and Discussion

Present work aimed to study analytically the relationship between unreliable investment environments of stock returns and income smoothing among the companies listed by Tehran Stock Exchange Organization. Available data was processed by MS Excel software and also time series and also mixed regression (for auto-correlation removal) and cross-sectional (panel data) data combination methods were employed to test hypothesis.

The studies associated with the relationship between stock returns and income smoothing in Tehran Stock Exchange are generally conducted based on some instances from financial statements. Considering several researches about the relationship between stock returns and income smoothing in different companies entire the world as well as higher importance of in-company variables and limited number of conducted studies inside Iran caused the researcher to study the relationship between unreliable investment environments of stock returns and income smoothing among the companies listed by Tehran Stock Exchange Organization in uncertain conditions and find a reply for above questions.

The main hypothesis prepared based on the presence or absence of a significant relationship between companies' stock returns and income smoothing in uncertain conditions above investment environment. Also, using constituents of conditions of environmental uncertainty and income smoothing for performance improvement, such factors were measured as independent variables. Consequently, the results of this hypothesis testing and sub-hypotheses in existing companies are as follows:

1. There is a direct and significant relationship between stock returns and income smoothing in uncertain conditions above investment environment (sale variability) in companies listed by Tehran Stock Exchange Organization.
2. There is a direct (positive) but insignificant relationship between companies' stock returns and income smoothing in uncertain conditions (Ratio of forecast deviation and actual profit)in companies listed by Tehran Stock Exchange Organization.

Results of present study answer partly existing questions and ambiguities about the relationship between stock returns and income smoothing in environmental uncertainty conditions among the companies listed by Tehran Stock Exchange Organization. Therefore, in order to provide a perfect model, more researches should be conducted and the relationship between some variables should be tested in different time intervals through homogenizer time indicators and selecting other time scales (monthly-seasonal) so that generally a better judgment can be done regarding presence of the relationship. Furthermore, a judgment can be done about the future performance of company by designing a model using former transactions and indicators of productivity and profitability.

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