A Comparative Analysis of the Effects of Reducing Prediction Errors of Earnings per Share (EPS) and Dividends per Share (DPS) On the Firms' Stock Returns

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Abstract: Investors use the expected returns as a factor to buy and sell stocks. If there is a little difference between the expected returns and the accounting returns, the former can be safely used by investors. Accordingly, the present study examines how reducing prediction error and cash dividends per share are related to the increased returns on equity. Therefore, the main objective of the study is to help investors when taking decisions to buy and sell stocks in the Tehran Stock Exchange and also assist investors, decision-makers, and financial managers to predict profit in the budget for next fiscal year so that they will be able to compare the realization of actual and expected returns and make adjustments in cash dividends polices if needed. So, the prediction error is very important to such people. The data in this study were collected from 120 firms listed in the Tehran Stock Exchange in the time period from 2007 to 2011. The research hypotheses were tested using the correlation test. The results of the study indicated that there is a negative significant relationship between the DPS and EPS prediction error and stock returns. It was also noted that the intensity of the relationship or the effect of these two variables is the same on the stock returns. According to the findings of the study, firms must take into account the prediction errors in their earnings as such errors affect the stock return volatility. Investors and decision-makers are also recommended to pay more attention to these factors. Managers are also required to measure the prediction error in their planning and budgeting especially in predicating earnings per share and dividends per share.

Keywords: prediction error, earnings per share, dividends per share, stock returns, stock exchange

1. Introduction

Income as one of the most important components in financial statements has received much attentions and the great number of studies conducted on various aspects of income (accruals and cash) shows the significance of earnings. In addition, investing on stocks and

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stock returns is one of the issues of interest for investors, researchers, and financial analysts.

Earnings per share and dividends per share are widely used in evaluating stock returns and stock prices. Perhaps EPS and DPS are the most important types of earnings reflected in financial statements of profit entities. Accounting earnings are measured and reported on an accrual basis. As the analysis of income on accrual and cash basis will reduce the average prediction error, dividing the accrual part of income will also results in the reduced prediction error. Prediction error has been much significant in the previous research about predicting stock returns and the firm's market value. Accounting earnings and their components are types of earnings that are taken into account by individual when taking decisions. Accounting earnings are calculated and recognized on the accrual basis. Under the accrual approach, earnings can be reported if the revenues are realized and expenses occurred. Since in the accrual approach the identification of revenues and expenses is not necessarily accompanied by receiving or paying cash and given that predictions and estimations are used to calculate revenues, a question that arises here is: To what extent can we trust in figures predicted or estimated when taking decisions? The response to this question is highly significant in the sense that taking incorrect decisions based on insufficient or incorrect information will lead to misallocation of resources. Managers' freedom in using accrual and cash variables as well as estimating or predicting these variables will affect the firms' stock returns. At present, the firms listed in the Tehran Stock Exchange are required based on the exchange circulars and regulations to present information about real and predicted earnings per share and disclose subsequent changes made in predictions. However, there are no defined accounting standards concerning the ways earnings per share are calculated and reported. Only Accounting Standard No. 1 has made obligatory the calculation of earnings per share in the balance sheet date and their disclosure in income statements in footnotes. Recently, the Audit Organization has embarked on the codifying a special standard drafting in this regard that is expected to improve the quality of financial reporting. In addition, dividends per cash (DPS) show earnings available to common shareholders that are distributed as returns on equity. DPS shows how the firm's returns on equity are divided and it mainly reflects the management awareness of ambiguities related to future earnings. The main objective of the financial reporting is to help users, especially stockholders to take economic decisions. Accordingly, the assessment of the firm's value is used as a basis by stockholders when taking economic decisions. Accounting earnings that are prepared using the accrual system is regarded by many users of financial statements as a tool to evaluate the firm performance. The performance evaluation refers to the general assessment of financial positions of firms and their operation outcomes for the purpose of taking rational decisions.

Beaver et al. (1999) examined the relationship between accrual and cash components of revenues and the firm's market value. The results indicated the explanatory power of accrual and cash components of revenues concerning the firm's market value with the only difference that the cash coefficients are positive while accrual coefficients are negative. Barrett et al. (2002) examined to extent to which the analysis of accounting earnings can contribute to the prediction of abnormal profits and the explanation of the market value of common stocks. The results of their study indicated that analysis of earning in accrual and cash terms would reduce the prediction error of the stock values. Beaver et al. (2004) examined the relationship between cash and accrual components of earnings and the firm's value. They divided the accruals into four components. The results indicated that taking abnormal profits and the firm's market value as dependent variables and dividing accruals into their constituent elements will reduce the prediction error of the firm's market value.

Research hypotheses

To answer the main research question, the following hypotheses were proposed in this study:

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H1: There is a relationship between the reduced EPS prediction error and the increased stock returns.
H2: There is a relationship between the reduced DPS prediction error and the increased stock returns.
H3: Explanatory power of DPS and EPS prediction error is the same with the increased stock returns.

2. Methodology

The present study employs a correlational research design in the sense that the findings of the study will be generalized to the whole population under study based on the data collected from the Tehran Stock Exchange and testing the accuracy of the research hypotheses. The collected data for each firm in the research sample were codified in the Excel Spreadsheet and then were submitted to SPSS Software for the final analysis. Given that the type of the relationship in the hypotheses was correlational and the data scale is a relative scale with two or more variables and whatever number of the subjects, the regression analysis test was used to analyze the data. Accordingly, multivariate regression analysis was used to test the research hypotheses. The research sample in this study included 120 firms listed in the Tehran Stock Exchange in the time period from 2007 to 2011.
To calculate statistical indices of relative DPS and EPS predicted errors, the two error measurement models were used:

1) eEPS -P = (EPS-R – EPS-P) / EPS-P
2) eDPS -R = (DPS-R – DPS-P) / DPS-P

Real EPS and DPS were used as indices to measure error rates. In order to obtain sound and rational results, the absolute values of the prediction errors were used in the present study. If we consider the relative DPS and EPS errors, some are positive and some are negative. Therefore, it is not possible to clearly determine their relationship with other variables. Since the positive values cover the negative ones, the error rates will neutralize each other. So, it would be better to use the absolute values of error rates as the important matter is the value of errors regardless of whether they are positive or negative. Error rates may be overestimated or underestimated. But this is not important as the relative predicted errors have been converted into absolute values.

Table 1: Statistical Indices of Absolute Values for EPS Predicted Errors by Year

EPS Error (Minimum Absolute Value)	EPS Error (Minimum Absolute Value)	EPS Error Absolute Value (Std. Err)	EPS Error Absolute Value (Variance)	EPS Error Absolute Value (Std. Dev)	N	EPS Error Absolute Value (Means)	Year
347.88	0.00	5.33	2045.89	45.23	72	15.43	2007
793.90	0.00	11.66	9795.13	98.97	72	27.25	2008
281.72	0.00	5.62	2302.14	47.98	71	23.74	2009
151.32	0.00	3.45	844.46	29.06	71	18.52	2010
100.00	0.00	2.41	413.40	20.33	71	15.29	2011

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793.90	0.00	2.93	3079.76	55.50	359	20.07	All Grap

Table 2: Statistical Indices of Absolute Values for EPS Predicted Errors by Year

EPS Error (Minimum Absolute Value)	EPS Error (Minimum Absolute Value)	EPS Error Absolute Value (Std. Err)	EPS Error Absolute Value (Variance)	EPS Error Absolute Value (Std. Dev)	N	EPS Error Absolute Value (Means)	Year
64.25	0.00	3.10	317.37	17.81	33	12.49	2007
88.27	0.00	2.86	360.77	18.99	44	13.52	2008
90.36	0.00	3.56	480.27	21.92	38	16.13	2009
88.57	0.00	3.26	434.65	20.85	41	12.93	2010
90.48	0.00	3.62	601.74	24.53	46	22.43	2011
90.48	0.00	1.50	452.02	21.26	202	15.75	All Grap

Table 3: Statistical Indices of Stock Returns by Year

Stock Returns (Minimum)	Stock Returns (Minimum)	Stock Returns (Std. Err)	Stock Returns (Variance)	Stock Returns (Std. Dev)	N	Stock Returns (Means)	Year
566.61	-52.62	10.95	8517.58	92.29	71	64.97	2007
494.61	-44.57	13.57	13440.99	115.94	73	95.67	2008
408.03	-44.84	7.07	3647.76	60.40	73	20.30	2009
83.86	-49.89	2.90	614.62	24.79	73	-5.70	2010
317.29	-54.57	7.50	4111.45	64.12	73	25.13	2011
566.61	-54.57	4.48	7277.03	85.31	363	39.94	All Grap

3. Results

H1: There is a relationship between the reduced EPS prediction error and the increased stock returns.

Table 4: Correlation coefficient between EPS prediction error and stock returns

Var.x & Var.y	Means	Std.Dev	r(x,y)	r^2	t	p	N	Constant dcp:y	Slope dcp:y	Constant dcp:x	Slope dcp:x
EPS Error Absolute Value	16.21										

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Stock Returns	24.02	51.19	-0.16	0.0265	-3.00	0.00	333	28.69	-0.29	18.43	-0.09

Table 4 shows the correlation coefficient between the absolute value of EPS prediction error and stock returns as the dependent variable. As can be seen, the correlation coefficient r(x,y) = -0.18. As a result, there is a negative significant relationship between the EPS prediction error and stock returns (P = 0.00), indicating that a decrease in EPS error rates will result in an increase in stock returns. So, the first hypothesis is confirmed. The results of testing this hypothesis show that the value of the coefficient is close to -1, showing a negative relationship between the two variables. In addition, r2 value (0.0256) shows that incremental changes in stock returns arises from the reduced EPS prediction error. Therefore, companies must take into account the error rate when predicting earnings so that the reported earnings are shown more realistically in financial statements. Besides, stockholders and buyers are also recommended to pay attention to the error rate when making decisions. The value of predicted earnings included in income statements shows the firm's ability in terms of profitability and stock returns. Financial analysts show sensitivity to the predicted earnings. Based on this hypothesis, one of the factors contributing to stock returns is the reduction of the EPS prediction error. So, this is one of the important factors facilitating decisions-making in the Tehran Stock Exchange.

According to the results in the above table, the linear regression equation can be written as follows:

$$Y = ß0 + ß1x1$$

Stock Returns (Y) = 28.69 – (0.29 *| e-EPS|)

H2: There is a relationship between the reduced DPS prediction error and the increased stock returns.

Table 4: Correlation coefficient between DPS prediction error and stock returns

Var.x & Var.y	Means	Std.Dev	r(x,y)	r^2	t	p	N	Constant dcp:y	Slope dcp:y	Constant dcp:x	Slope dcp:x
EPS Error Absolute Value	15.10	20.86									
Stock Returns	31.53	53.10	-0.18	0.0327	-2.50	0.01	186	38.48	-0.46	17.43	-0.07

Table 4 shows the correlation coefficient between the absolute value of DPS prediction error and stock returns as the dependent variable. As can be seen, the correlation coefficient r(x,y) = -0.18. As a result, there is a negative significant relationship between the DPS prediction error and stock returns (P = 0.00), indicating that a decrease in DPS error rates will result in an increase in stock returns. So, the second hypothesis is confirmed. The results of testing this hypothesis show that the cash earnings and reduced prediction errors are related to the increased stock returns because the value of the coefficient is negative and the determination of coefficient (r2) is 0.0327 that shows a part of stock return volatility. Dividends per share are among determined factors in firm's financial reports. Stockholders and investors keep the track of stock returns in DPS index hoping to receive cash dividends from investments. Therefore, it can be said that cash dividends determine the stock returns. Firms often assign a percentage of their predicted income to DPs. Consequently, the error resulting from this variable affects DPS. Therefore, managers should try to determine the error rate as accurately as possible to reduce it and thus increase stock returns.

The linear regression equation for the second hypothesis can be written as follows:

$$Y = ß0 + ß2x2$$

(Y) = 38.48 – (0.46 *| e-EPS|)

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H3: The hypothesis addresses the relationship between the reduced EPS and DPS prediction error and the increased stock returns to determine which one accounts for this explanatory power or the intensity of the relationship. Findings in tables 6 and 7 are explained as follows:

Table 6: Results of Multivariate Regression Analysis

Statistics	Values
Multiple R	0.27
Multiple R^2	0.0723
Adjusted R^2	0.0621
F (2,181)	7.06
p	0.00
Std. Err. of Estimate	51.62

Table 7: Regression Summary for the Dependent Variable (Stock Returns)

N=184	Beta	Std. Err.of Beta	B	Std. Err.of B	T(181)	p-LEVEL
Intercept			43.80	5.04	8.68	0.00
EPS Error Absolute Value	-0.20	0.073	-0.61	0.22	-2.77	0.01
EPS Error Absolute Value	-0.15	0.073	-0.37	0.19	-0.99	0.05

Multivariate regression analysis was used to test the third research hypothesis. Besides, Z test was used to compare the correlation coefficients of stock returns and those of |e-EPS | and |e-DPS | as follows:

$$z = \frac{z_n - z_{r_2}}{\sqrt{\frac{1}{(N_1 - 3)} + \frac{1}{(N_1 - 3)}}}$$

$$z_r = \frac{1}{2}\ln(1 + r) - \frac{1}{2}\ln(1 - r)$$

The value of calculated Z is 0.22 which is not significant at 0.95 confidence level (P = 0.82), showing that there is no significant relationship between the calculated correlation coefficients. In other words, the two variables have the same explanatory power to predict stock returns. The value of R is 0.27 and that of R2 is 0.07. This shows that these two variables affect stock return volatility. The calculated correlation coefficients are significant at 99% confidence level (F = 7.06, P = 0.00). in addition, the regression coefficients calculated for both variables are significant. The results of testing the third hypothesis indicate that both variables equally affect the stock returns. Although there are some slight differences in the values of correlation coefficients, the test results shown the same level of explanatory power concerning the stock returns. Of course, the value of Z illustrates these findings. Perhaps we might be able to observe different results using different data in other time periods. The users of data from the Stock Exchange Organization can

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benefit from the results obtained through testing the research hypotheses.

The multivariate regression equation for the third hypothesis can be written as follows:

$$(x1) + ß2(x2)\ y = ß0 + ß1$$

$$Y = 43.80 - 0.61|e\text{-}EPS| - 0.37|e\text{-}DPS|$$

4. Conclusion and suggestions

The results from testing the first research hypothesis state that there is a negative significant correlation between a decrease in the relative EPS error prediction and stock returns. The value of correlation coefficient is - 0.16 and the error level is P = 0.00. The hypothesis shows a negative correlation as the value of the correlation coefficient is close to -1. As a result, a decrease in the EPS error will lead to an increase in stock returns. The alpha value (α) is 0.1 and the value of coefficient of determination (R2) is 0.0265, indicating that nearly 0.26% of stock return volatility is shown by the reduction rate of EPS error. Since 0 < R2 < 1, a part of stock return volatility is expressed by EPS error rate.

As stated by the second hypothesis, there is a negative significant relationship between the DPS prediction error and stock returns. Since the correlation coefficient r(x,y) = -0.18, P = 0.01, and R2 = 0.0327, the second hypothesis is confirmed at 99% confidence level, indicating that a decrease in DPS error rates will result in an increase in stock returns and vice versa. The results from testing the third hypothesis suggest the explanatory power of the independent variables concerning stock returns is at the same level. However, comparing the coefficients of determination for the two variables shows that DPs error rate is more effective in this regard. So, the equality of the explanatory powers of these tow variables can be attributed to the data errors. The value of R2 obtained through the multivariate regression analysis is 0.07, suggesting that about 7% of stock return volatility is because of the reduced DPS and EPS prediction error at 99% confidence level (P = 0.00).

Generally, the above findings suggest that the reduction of DPS and EPS error rates will increase stock returns. So, there is a negative relationship between DPS and EPS error rates and stock returns.

In general, the results indicate that managers and decision makers must take into account the prediction errors when forecasting earnings as low or high levels of prediction error can affect stock return volatilities. So, they are recommended to consider these errors in the firms' financial policies. In addition, prediction errors affect shareholders' decisions concerning the purchase or sale of storks. Moreover, variables such as DPS and EPS are considered as very important factors in financial statements of companies and in general in financial status of listed companies on the Stock Exchange.

According to the findings of the study, companies are advised to consider the error rates when predicting the accounting earnings so that the reported earnings are expressed more realistically in financial statements. Besides, stockholders and buyers are also recommended to pay attention to prediction errors when making decisions and act with confidence to make investments. Managers and supervisors in the Tehran Stock Exchange must adopt some mechanisms in this regard. Investors cannot simply use the internal growth rate of the earnings per share and dividends per share to predict stock returns. When analyzing securities that use earnings per share, investors must carefully understand how to estimate earnings and know the role of higher earnings in stock returns. Therefore, factors such as DPS and EPS can be used in explaining stock returns for investors and decision makers. Other financial variables such as equity shares, liquidity of the stocks, and the composition of the shareholders can also influence the relationship between independent variables and stock returns. By using such variables in our analysis, we might be able to obtain more accurate results.

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