



A Study of the Effect of Financial Leverage on Earnings Response Coefficient through out Income Approach: Iranian Evidence

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Abstract: Corporations raise their equity by different methods. Decision making on the choice of better methods is a challenge most financial managers of corporations face. In particular, accounting earnings come with informative content. In companies with outstanding debt the reaction of stock prices to unexpected earnings will be affected by the firm's bankruptcy risk. This is because it is the bankruptcy risk that determines the mechanism for allocation of wealth change due to unexpected earnings among stockholders and bondholders. Thus, it is expected that financial leverage is influences the earnings response coefficient. In this paper the relationship between financial leverage and the earnings response coefficient is studied through an income approach. The aim of the study is to provide further evidence about factors influencing the earnings response coefficient. The study includes corporations listed on the Tehran Stock Exchange. Research data has been collected from the seven years period from 2002 to 2008, and data analysis was done using multiple regressions. Results indicate that the earnings response coefficient for the low-leverage firms group is larger than the high-leverage ones, with differences in the means among groups statistically significant.

1. Introduction

T investment decisions in financial markets are influenced by information resources. From the viewpoint of stock exchange theorists, one useful source of data is financial statements, with one of the main goals behind financial

statements to help users of financial data and facilitate their decision making. Since financial statements are public goods, people may use this information without restrictions, and are capable of making up for the lack of data and information asymmetry as the result of lack of access to other inside sources of information.

One of the most important factors in financial reporting is the declaration of information related to earnings, which has probably attracted the highest rate of attention from investors. The first strong evidence on the reaction of stock markets to the declaration and publication of earnings information was provided by Ball and Brown (1968). Their research indicated that reactions of investors to firms with good news resulted in positive abnormal returns. They also observed that the reaction of investors to firms with bad news resulted in negative unexpected abnormal returns.

Many empirical studies have focused on the manner of market reaction to earnings declarations. In this study we examine the question, why does the market react more strongly to good or bad news for some firms in comparison to other firms, and specifically why does the stock market react more strongly to unexpected earnings for some firms versus others. In this area of research, we focus on the effect of capital structure, a challenge for most firms. Investors have different reactions to earnings reports. Scott (2003) believes the different reactions of stock markets are due to a number of different reasons, such as systematic risk (beta), capital structure, quality of earnings, and persistence of earnings, investment growth opportunities, and information load of prices. The earnings response coefficient (ERC) is another measure for the abnormal return observed in reaction to unexpected elements of earnings declared by a firm publishing its earnings report. In other words, ERC measures the sensitivity of stock markets to the reporting of earnings through a regression slope coefficient between abnormal returns and unexpected earnings (Scott, 2003).

Firms raise their equity by different methods. Decision making on the choice of the best methods is a challenge that most financial managers of firms face. In particular, accounting earnings come with informative contents, in companies with outstanding debt. The reaction of stock prices to unexpected earnings will be affected by liability risk. This is because it is the liability risk that determines the mechanism for allocation of wealth change due to unexpected earnings among stockholders and bondholders. Thus, it is expected that financial leverage has an influence on ERC.

Dhaliwal, Lee and Fargher (1991) held that when accounting earnings contain information concerning the value of the whole firm (rather than value of equity), in companies with outstanding debts the reaction of stock prices to unexpected earnings will be influenced by liability risk. This is because it is the liability risk that determines the mechanism for allocation of wealth change due to unexpected earnings among stockholders and bondholders. Thus, it is expected that financial leverage (related to liability risk) is influential on ERC. This paper focuses on capital structure as a factor influencing the ERC. Financial leverage is used as the index of capital structures. The main research question is: “Does financial leverage affect the ERC and why?”

2. Review of Related Literature

Many studies have measured the reaction of markets to declaration of earnings, some of which are introduced below.

Kormendi and Lipe (1987) focused on the relationship of earnings and returns. Their results showed that the relationship between stock returns and earnings was probably dependent on persistence of the earnings process. The results gained based on the model they designed for persistence of the earnings process confirmed their forecast; thus one factor influencing the ERC was recognized as persistence of the earning process.

Collins and Kothari (1989) studied the relationship between systematic risk and ERC. They observed that the only reducer of ERC was systematic risk (beta). They also found that the rate of growth opportunities factor positively affected the ERC.

Wikil (1990) studied the effect of auditor change on the quality of earnings and ERC. He assumed that the ERC of companies changing their auditors would face significant changes. Statistical results of his works showed no significant change and he failed to establish his theory in statistical terms.

Collins and Salatka (1993) conducted an empirical study which has focused on the effects of changes in financial reporting of multinational firms due to financial reporting based on international standards. They also studied the effects of money change due to change of standards used as basis for reporting on the ERC. Results of the study showed that change of national to international standards and national currency had no significant effects on ERC.

Lev and Thiagrajan (1993) studied the relationship of quality of earnings and stock returns. They determined the 12 fundamental variables used by financial analysts in assessing quality of earnings, and measured the quality of earnings of each firm by giving 0 and 1 scores to every one of the 12 fundamental variables. Results of their works demonstrated that there was a significant statistical difference between ERC in high-quality and low-quality groups; groups having higher earnings qualities have higher ERCs as well.

Dhaliwal, Lee and Fargher, (1991) conducted an empirical, study which has focused on the relationship between unexpected earnings and abnormal return of stocks, or ERC and effect of financial leverage on it. They mean to collect more evidence about the factors influencing ERC and in particular to study the effect of capital structure on ERC. They assumed that financial leverage was effective on ERC, and based on that assumption they classified firms based on presence or absence of debts in their capital structures and their financial leverage level. Results of their works showed that ERC of firms lacking debts or having low financial leverage was larger than firms with high financial leverage.

Dhaliwal and Reynolds (1994) demonstrated that default risk may also negatively affect the ERC. They used a ranking of stocks and debt ratios to measure the bankruptcy risks.

Billings (1999) conducted a research similar to that of Dhaliwal and Reynolds (1994), but added earnings growth rate, systematic risk, earning stability to his regression model. Results of his work showed that default risk had a relatively limited role in describing the ERC.

Feltham and Pae (1999) analytically studied the effect of accounting accrual items on earnings instability and ERC. Their analysis showed that if earnings management does not affect the instability elements of unexpected earnings, the variance of unexpected earnings will decrease. However, when earnings management transfers the persistence of earnings process, the variance of unexpected earnings will not suffer. Thus, in general the misplacing caused by earnings out of managed undertaken items, reduces the ERC.

Kim, Willet and Jang (2002) focused on the relationship of liability risk and ERC. They included factors such as beta, growth opportunities rate, persistence of earnings process, and earnings growth ratio in their model. Yet results showed that the publication and payment of debts, or rise and fall of default risk, was related to

factors other than default risk, opening the way for involvement of other unreliable indices in the whole process.

Chambers et al, (2004) studied the effects of the risk on the ERC. They defined the final risk as uncertainty in connection with future dividends or future earnings. Their results point to a positive relationship between final risk and ERC.

Bae and Sami (2005) conducted an empirical study which focused on the effect of potential environmental liabilities on ERC. Results of their regression model confirmed their hypothesis, establishing the point that firms having potential environmental liabilities have smaller ERC reactions in comparison to firms lacking such liabilities.

Chevis and Sommers (2005) attempt to provide another method for interpretation of market through information transferred by earnings announcements and declarations, they related the ERC directly to the persistence of earnings process. The difference of this study with other efforts in handling the effects of persistence of earnings process on ERC was in that they took persistence of unexpected earnings rather than just earnings as the factor influencing the ERC. Also, rather than interpreting the ERC instead of classifying it into transitory and permanent, they classified it into several new groups. Findings of their work confirmed the existence of a relationship among research variables.

Ghosh, Gu, and Jain (2005) attempted to prove that firms disclosing raises due to keeping of earnings and incomes have a higher quality of earning and a bigger ERC than firms only reporting on the raises due to keeping of earnings. Their findings were in line with their research assumptions.

Sajjadi (1998) studied the informative contents of unexpected earnings and their relationship to abnormal returns of firms and also relationships of unexpected earnings and firm features such as size, age, foreign currency reliance, government ownership, and financial leverage in Iran. Results of his work confirmed both hypotheses and the relationship between earnings and firm features and between unexpected earnings and abnormal returns were established.

Saghafi and Kordestani (2004) studied the relationship of earnings quality and accumulated abnormal stock returns in firms experiencing increased (decreased) dividends. One of the results of their study, which included 50 corporations listed in Tehran Stock Exchange, was the confirmation of a positive significant

relationship between changes of unexpected earnings and accumulated abnormal stocks returns.

3. Research Hypothesis and Methodology

According to the objective of the study as well the research problem the below hypothesis was postulated in this study.

H1: The ERC in firms with low financial leverage is larger than the ERC in firms with high financial leverage.

The present study is an empirical one, and given the fact that historical data have been used for testing its hypotheses, it may be classified as a pseudo-experimental study. It covers Iranian fiscal years 2001 to 2007 (corresponding to the period of March 21, 2001 to March 20, 2008); corporations listed in Tehran Stock Exchange during the same period.

The statistical population includes all corporations listed in Tehran Stock Exchange having the following features:

- (1) Firms are of manufacturing type. This criterion was applied so that information coming all firms in related industries is in harmony.
- (2) Information related to their financial statements is available for 2002 to 2008.
- (3) Their fiscal years are closed on March 20 of each year.
- (4) Their stocks are sold and purchased in each fiscal year (i.e. no dealing halt for more than one year or more).

Their fiscal years have not changed during the defined period. The study includes all eligible corporations inside the statistical population, thus sample will be equivalent to statistical population. Once all restrictions quoted for the statistical population were applied, 98 corporations were finally chosen as members of the statistical population.

3.1 Model and Research Variables

$$AR_{it} = \alpha_1 + \alpha_2 UX_{it} + \gamma D_{it} UX_{it} + \varepsilon_{it} \quad (1)$$

where:

AR_{it} = abnormal return of firm i in year t,

UX_{it} = unexpected earnings of firm i in year t, and

D_{it} = dummy variable (equal to zero if financial leverage above medium of leverages, 1 if it is lower).

The independent variables of the above model are degree of financial leverage and unexpected earnings. In an income approach the financial leverage points to the relationship of earnings before interest and tax and earnings of each stock as well. The degree of financial leverage is an indicator of the percent of change in the earnings distributable among common stockholders, being a result of a specific change in earnings before interest and tax, calculated as follows:

$$\text{Financial Leverage} = \frac{\text{Earnings before Interest and Tax}}{\text{Earnings before Interest and Tax} - \text{Interest Costs}} \quad (2)$$

In this study the financial costs is taken as the interest cost of a firm. Financial leverage is included in the regression model as a dummy variable.

Unexpected earning is the difference of actual earnings per share and its foreseen earnings. To calculate the unexpected earnings through this approach, the present study uses the following formula:

$$UE_{it} = EPS_t - EPS_{t-1} / EPS_{t-1} \quad (3)$$

where:

UE_{it} = unexpected earnings per share i in current year,

EPS_t = Adjusted earnings per share i in current year, and

EPS_{t-1} = earnings per share i in previous year.

The dependent variable of the model is abnormal stock returns. It is defined as the difference of actual return and expected return of a given stock. Abnormal return may be calculated as follows:

$$AR_{it} = R_{it} - R_m \quad (4)$$

where:

R_{it} = actual return of stocks, and

R_m = Expected return of stocks.

Actual return of stocks may be calculated as follows:

$$R_{it} = (P_{it} - P_{it-1}) + \text{DPS} - (c \times 100) / P_{it-1} \quad (5)$$

where:

P_{it} = market value of stocks of firm i in year t ,

P_{it-1} = market value of stocks of firm i in year $t-1$,

DPS = dividends per share based on their number at the beginning of fiscal period, and

c = number of increased stocks out of cash contributions and claims (before or after the general meeting)

Normally different models are used to calculate expected stock returns. The present study uses an adjusted market returns model. According to this model it is assumed that the expected return is the same for all stocks and the return of each bond is similar to market return. Therefore:

$$E(R_{it}) = E(R_m)$$

and the market return is calculated as follows:

$$R_m = I_1 - I_0 / I_0$$

where, I_0 is the cash return index and price announced by Tehran Stock Exchange at the beginning of the year, and I_1 is the cash return index and price at the end of the year.

Due to certain restrictions applied to increase or decrease of prices in daily deals, Tehran Stock Exchange leaves no chance for use of daily or weekly returns. Yet most of such restrictions are not so strong on monthly or annual returns. Also, due to long dealing halts for many firms, it is not possible to calculate returns on weekly or monthly basis. Thus, the present study calculates stock returns on annual basis.

4. Analysis of Findings and Results

Based on the empirical results shown in Tables 1 and 2, the research hypothesis holds: The ERC in corporations with low financial leverage is larger than the same in firms with high financial leverage.

To classify firms into groups of high and low financial leverage the mean financial leverage of all firms during the 7 fiscal years was calculated. Firms having financial leverage above the calculated mean were put in the high leverage groups, and those with lower than mean leverage were placed in the low leverage group. Descriptive statistics of research variables are presented in Table 1.

Table 1.
Descriptive Statistics of Research Variables

Variables	Average	Lower End of Certainty Margin	Upper End of Certainty Margin	Trimmed Average	Mean	Standard Deviation	Min	Max
Abnormal Return	-0.077	-0.143	-0.011	-0.096	-0.0836	0.3276	-0.6316	0.9923
Unexpected Earning	0.4085	0.2662	0.5508	-0.3533	0.2624	0.7062	-0.7327	4.9782
Financial Leverage	1.366	1.109	1.624	1.318	1.186	1.278	-4.25	8.537

According to Table 2 the model coefficient is 0.317 meaning about 32% of the response variable changes (abnormal return) may be described by the independent variable (unexpected earnings). The probability value related to Fischer statistic (F) indicates that the model has the required potential for analysis.

Table 2.
Summarized Results of Modeling and Test aimed at Analyzing the Main Research Hypothesis

Research Hypothesis	Γ Coefficient	Fischer Statistic	Fischer Statistic Value Bidirectional Assumption	Fischer Statistic Unidirectional Assumption	Test Result
Hypothesis	0.317	5.344	0.0230	0.0115	Confirmed

The probability value related to statistical zero assumption pointing to lack of relationship between the independent variable of unexpected earnings and response

variable ($H_0:\alpha_2=0$) is 0.008 which is less than 0.05. The probability value of zero statistical assumption pointing to lack of relationship between independent variable of unexpected earnings of firms with low and high financial leverage and response variable of abnormal return ($H_0:\gamma=0$) is 0.009 which is less than 0.05. Thus the assumption is rejected with 95% reliability. As a result there is a significant relationship between the two variables. The processed model is as follows:

$$AR_{it} = -0.152 + 0.185 UX_{it} + 0.317 D_{it}UX_{it}$$

5. Additional Findings

The correlation coefficient between independent variable (unexpected earnings) and dependent variable (abnormal return) is 0.326 and the probability value of its significance ($H_0: p= 0$) is 0.0001, which is less than 0.05, thus a direct and significant relationship exists with 95% reliability.

In the dispersion diagram of standardized residuals against standardized forecasts, there was no trend and symmetry of changes is around line zero. Thus homogeneity in the variance of residuals may be confirmed.

As shown in Table 3, the probability value of Kolmogorov-Smirnov test is 0.200, which is more than 0.05, thus with a reliability of 95% residuals are normal. Also, the quintile diagram of residuals normal confirmed the normality. The value of Durbin-Watson statistic is 1.963, and given its closeness to 2 the independence of residuals may be accepted. Also, the value of runs test is 0.084, which is more than 0.05. Thus with a 95% reliability residue independence may be confirmed. The value of VIF statistic is also less than 0.05, so there is no collinearity problem in the model. The residual statistics section minimum and maximum of standardized residuals are between -3 and 3; hence the model is free of dispersed values.

Table 3.
Summarized Results of Tests aimed at Analyzing Fundamental Model Hypothesis

Fundamental Research Hypotheses	Normality of Residuals (Kolmogorov-Smirnov)	Residue Independence (Durbin-Watson)	Collinearity statistics (VIF)
Value	0.200	1.963	0.002

Confirmation of a positive significant relationship between accounting earnings and stock returns in this and numerous other papers points to the fact that

change of earnings brings about changes in the investors' mentalities which in turn reflect in their change of behavior. Change of stock returns due to change of unexpected earnings shows that earnings reported in financial statements of firms enlisted in Tehran Stock Exchange has informative contents. This finding goes with those of previous empirical studies (Ball and Brown, 1968; Sajjadi, 1998; Saghafi and Kordestani, 2004).

6. Conclusion, Research Limitations and Suggestions for Future Research

Confirmation of a significant relationship between accounting earnings and abnormal return in different studies points to the changes in investor's beliefs and behaviors as a result of change in earnings. Indeed, changes created in stock prices due to change in accounting earnings is a significant marker of change in investment beliefs under influence of informative content of earnings. Profitability of accounting earnings is a sign of the informative content of earnings reported by firms enlisted in Tehran Stock Exchange provided through their financial statements.

Confirmation of the research hypothesis shows that investors of Tehran Stock Exchange take into account the capital structures of firms and their outstanding debts while reacting to unexpected earnings changes. It is expected that in firms with high financial leverage, increasing in firm's earnings result in increasing in solvency. Thus good news in such firms is mostly to the benefit of creditors. Results of this paper too show that lower ERC is smaller in high financial leverage firms than low financial leverage ones. In other words, in Tehran Stock Exchange, financial leverage is considered as relevant information in market reaction to unexpected firm earnings.

As a caveat, restrictions and problems plaguing the research effort must be taken into account while interpreting its results and their generalization capacity. They were as follows: (1) As the restricted scope of our statistical population was limited to manufacturing corporations listed in Tehran Stock Exchange with fiscal years ending on March 20, generalization of results to other firms must be done with caution; (2) Due to restrictions and long terms halts of deals in Tehran Stock Exchange it was not possible to calculate abnormal stock returns on monthly basis and then calculation of accumulated abnormal returns. Thus, the abnormal stock returns were calculated annually at the end of firms' fiscal years; (3) Because of the above restrictions for the statistical population, many firms enlisted in Tehran

Stock Exchange were eliminated from the study and there was no possibility of classifying firms in different industries and studying each industry separately.

Because of the significance of informative content of accounting items, particularly accounting earnings, and the significance of ERC, it seems further research will shed more light on the factors influencing the ERC in Iran. The present study may be a sample for future efforts in the field. Proposed fields for future studies are as follows: (1) Studying the effects of systematic risk on ERC; (2) Studying the effects of auditing reports on ERC; (3) Studying the effects of firm size on ERC; (4) Studying the effects of rates of investment growth opportunities on ERC; and (5) Repeating the study in other time periods with possibility of classifying firms based on industries and comparing firms of each industry and taking into account firm size.

References

- Bae, Benjamin and H. Sami, 2005. The effect of potential environmental liabilities on earnings response coefficients, *Journal of Accounting, Auditing & Finance*, 20 (1) 43-70.
- Ball, R. and P. Brown, 1968. An empirical evaluation of accounting income numbers, *Journal of Accounting Research*, 2, 78 -159.
- Billings. B., 1999. Revisiting the relation between the doubtful risk of debt and the earning response coefficient, *the Accounting Review*, 74 (October), 509-522.
- Chambers , D J., R N. Freeman and A S. Koch, 2004. The effect of risk on price responses to unexpected earnings, *Journal of Accounting, Auditing & Finance* 20(4), 461-482.
- Chevis, G and G A, Sommers, 2005. The implied persistence of unexpected earnings and the complete range of ERCs" (April), Available at: www.papers.ssrn.com.
- Collins, D, and S. Kothari, 1989. An analysis of inter-temporal and cross-sectional determinants of earnings response coefficients, *Journal of Accounting and Economics*, 11, 143-181.
- Collins, D. and W. Salatka, 1993. Noisy accounting earnings signal and earning response coefficients: the case of foreign currency accounting, *Contemporary Accounting Research*, 10, 119-159.

- Dhaliwal, D. and S. Reynolds, 1994. The effect of the default risk of debt on the earning response coefficient, *The Accounting Review*, 69 (2), 412-419.
- Dhaliwal, D., K. Lee, and N. Fargher, 1991. The association between unexpected earning and abnormal security returns in the presence of financial leverage, *Contemporary Accounting Research*, 8, 20-41.
- Feltham, G A and J .Pae, 1999. Analysis of the impact of accounting accruals on earnings uncertainty and response coefficient, *Journal of Accounting, Auditing & Finance*, 15, 199-220.
- Ghosh, Alope, Gu, Zhaoyang and Jain, 2005. Sustained earnings and revenue growth, earnings quality, and earnings response coefficient, *Review of Accounting Studies*, 10, 33-57.
- Kim, Y., R. Willet, and J. Jang, 2002, Default risk as a factor affecting the earnings response coefficient, Available at: www.papers.ssrn.com.
- Kormendi, R, and R. Lipe, 1987. Earnings innovations, earnings persistence and stock returns, *Journal of Business*, 60, 323-345.
- Lev, B, and S. Thiagarjan, 1993. Fundamental Information Analysis, *Journal of Accounting Research*, 31, 190-215.
- Saghafi, Ali and Kordestani Gholamreza, 2004. Overview of the relationship between quality of earnings and the market reaction to cash dividend changes, *Iranian Accounting review*, 37, 51-72.
- Sajjadi, Hosein, 1998. Effective factors on unexpected earnings and its relationship with stock price, PhD Dissertation, Tehran University, Iran
- Scott, W. R. 2003. *Financial Accounting Theory*, 3rd. Edition, Toronto, Prentice Hall, 91-173.
- Wikil, Kwak, 1990. Earnings response coefficient and quality of earnings: the case of auditor change, U.M.I. Working Paper.