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Earnings Announcement Premium and Information Ambiguity

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ABSTRACT

Behavioral factors always play an important role in financial markets. All investors are not rational and their demand for riskiness of assets is influenced by their beliefs and feelings. Optimism, pessimism, self-confidence, ambiguity-aversion, etc. help changing the manner of decision-making process over time. So, this study aimed at investigating the role of accounting information on investors' ambiguity-aversion in economic environment of Iran. For this purpose, information about 120 companies listed in Tehran Stock Exchange during the period 2013 to 2017 was collected and analyzed. Multivariate regression models were used to analyze the data. The results show that earnings announcement premium for companies with high level of ambiguity, is more than for companies with low level of ambiguity. As a result, investors respond asymmetrically to good and bad news, and this asymmetry decreases with increasing of ambiguity level.

Keywords:

Information Ambiguity-Aversion, Earnings Announcement Premium, Investors' Response Asymmetry.

1. Introduction

Epstein (2008) also measured the impact of information ambiguity on expected returns on financial assets. Where the information obtained by investors is ambiguous. The level where good news boosts expected earnings is lower than the level of which the bad news shows the expected loss. The information provided by investors is ambiguous and if investors receive good news, they may not consider the good news because of ambiguity-aversion and make decisions based on the worst expected return status. Therefore, a subject that is ambiguous cannot be described with a specific trait or description and cannot be definitively analyzed with respect to a rule, process or a finite number of its steps. Uncertainty is a term used to describe a situation used for lack of specific knowledge. This lack of knowledge is not about knowing causes and effects, but about whether a particular event is significant enough to form a chain of causes and effects. Knight in 1921, for the first time in the field of finance, pointed out that uncertainty about the future of the decision-maker is divided into two parts: first, uncertainty with a certain probability distribution called risk, and second, uncertainty which its probability distribution is unknown. Later this part of the uncertainty was termed Knight uncertainty, and scholars such as Ellsberg (1961) called it as ambiguity and asserted that it had a significant influence on individuals' investment decisions.

Psychologists like Tversky and Kahneman are the creators of the "Prospect theory" that forms the micro intellectual financial behavioral basis. Emotional tendencies include "endowment", "loss-aversion" and "self-control". Faced with the distribution of uncertain possibilities, humans are reluctant to take risks. In inefficient markets, in addition to the fact that news and information is not widely distributed in the market, it is observed that investors' reactions to new news and information are sometimes more favorable or overreaction and sometimes less favorable or underreaction that cause inequality between real prices and market prices.. In general, people in ambiguous situations become doubtful and a tendency is formed in them called ambiguity-aversion. On the other hand, earnings forecasting and earnings announcement are the most important criteria for evaluating companies by investors. Company earnings announcements provide information to market analysts to evaluate the performance of companies. If the earnings announcement contains more information content, it can affect the behavior of users, especially actual and potential investors, causing market reaction and generating abnormal returns. Uncertainty at the company or market level can also affect investors' reaction to earnings announcement. Totally, the issue that makes the necessity of this research clear is what is the role of accounting information on investors' ambiguity-aversion?

2. Literature Review

In decision-making theory and economics, the ambiguity-aversion is considered as preferring the known risks to the unknown risks. There are two categories of imperfect predictable events that need to be selected: risky and ambiguous events. Risky events have a known probability distribution, whereas ambiguous events do not have a known probable distribution. From a market behavior ology perspective, it can be said that market traders have biases in their trades that will make trading mistakes for them. So that in the long run they may be unhappy with their behavior. One of these biases is ambiguity-aversion where humans are reluctant to take risks in faced with the distribution of uncertain possibilities. In general, people in ambiguous situations become doubtful and a tendency is formed in them called ambiguity-aversion. Given the increasing level of ambiguities in the capital market, many people prefer to enter another familiar market with less risk. However, as market risk increases, more and more market players are get out of it (Liu et al., 2018). The basic idea of traditional financial theories about decision-making under information uncertainty conditions is that because of complete information in market and market rational use of all information, any price deviation from fundamental value due to information uncertainty conditions is corrected by rational investors, just as there is certainty in everything. But the emergence of some exceptions and unusual phenomena in financial markets that could not be explained by traditional theories led to the emergence of a new behavioral financial paradigm and posed serious challenges to traditional financial theories. The behavioral finance paradigm, which is formed based on investors' behavioral bias and restriction in arbitrage, states that information uncertainty affects the tendencies of some investors

and causes increase in asset pricing error (Cronell et al. , 2017).

In the following, the researches presented in this area have been mentioned. Kurdistani and Sepid Dast (2012) found that investors' reaction to earnings news was lower than expected and resulted in abnormal returns earn after earnings announcement. Also the size of the company and the risk of arbitrage affect market efficiency. Increasing the size of the company and reducing the risk of arbitrage the efficiency of the market reaction increases. Hosseini Chegeni et al. (2014) found that there is a significant relationship between self-control, optimism, self-attribution, illusion of control, and conservatism biases with investor investment decisions, and ambiguity aversion behavioral bias has no positive and significant impact on investors' investment decisions. Foroughi and Aysek (2015) found that the market responses negatively to bad news but late announcement face with the positive reaction of market. In addition, there is no difference between late and early bad news in terms of market reaction, but late announcement of good news face with a positive reaction. Aghabeikzadeh and Foroughi (2017) found that the market reaction to annual earnings forecast news was higher than that of simultaneous interim earnings news, and the compatibility (incompatibility) of this two simultaneous news do not have a significant effect on the more information content of annual earnings forecast. Hamidian et al. (2017) found that under high uncertainty conditions in the market, investors' reaction to earnings is higher. But when there is high uncertainty in the information, this reaction decreases. The simultaneous examination of market uncertainty and information uncertainty (ambiguity) on investors' reaction to earnings announcement also shows that when there is high uncertainty in companies' information, investors' reaction to earnings announcement decreases. Arab Salehi et al., (2018) found that when there is high uncertainty in information, investors' reaction to earnings announcement is lower. In high uncertainty conditions, investors react less to good news of earnings announcement, which this less reaction consistent with the conservatism approach.

According to the efficient market hypothesis, investors react quite rationally to new distributed market information, stock prices are reasonably determined and reflect all available market information, and investor irrational behavior has no effect on returns. This study seeks to provide evidence to support Stein and Schneider's (2008) research that stated that the earnings announcement premium of companies is sensitive to ambiguity. It is expected that investors have more reaction to good news as companies' ambiguity increases, but their reaction to bad news is stronger when the company's ambiguity is lower. In this study, investors are expected to have ambiguous information about earnings before earnings announcement. As a result, investors in ambiguous conditions will have high premium demand for investing in these assets. Such an increase is known as earnings announcement premium and is expected to naturally increase with increasing the ambiguity levels. The research literature also shows that investors tend to show different and asymmetric reaction faced with good and bad news. Barberis et al. (1998) presented a model for investors' sentiment in which investors gain the company's future position through past news. Their model believes that investors are more likely to respond positively to bad news than to good news in good time, and on the contrary, investors are more likely to respond positively to good news than to bad news in bad time. Likewise, in Veronesi (1999) model, investors' conditions about market status are uncertain and therefore must be extracted through past market performance. Following a string of good market performance, investors naturally assume that this good performance will continue. As a result, any other good news will make a little change in investor decision-making, but bad news will have strong negative effects when investors predicted good status. Contrary to Barberis et al. (1998), Veronesi (1999) believed that in bad times, it is bad news which will have less negative impact on investors who predicted bad status and good news, although is received by market participants positively, can increase investors' uncertainty related to the future.

Pasteur and Veronesi (2009) argue that in the uncertainty conditions, receiving any information sign (such as earnings announcement) can lead to a revision of investors' previous beliefs about the future situation and provide the context for learning to gain awareness. They believe that the basis of learning is Bayes' theorem. Kim & Ha (2010) found that adding the investors' sentiment index to the capital asset pricing enhances model performance and explains the effects of size, value, and momentum better. Brad and Yeong

(2012) found that investors react asymmetrically to good and bad news under uncertainty. In high market uncertainty, they react to bad news but ignore the good news. Barberis et al. (2013) show that the earnings announcement premium, is stronger in countries with the highest increase in individual fluctuations at the time of earnings announcement. This indicates that the ambiguity in the earning information that needs to be disclosed is a major risk of global earnings announcement validity. Choi (2015) showed that when there is a great deal of uncertainty in the market, investors' learning is more than earnings announcement of companies, but if the stated information mark is not highly accurate, investors' learning of seasonal earnings announcement decreases.

Xu (2016), in a study entitled Aversion of information ambiguity and momentum effect on the Chinese Stock Market has dealt with this issue. The empirical results support two hypotheses and show that investors in face with higher ambiguity level demand higher momentum strategy returns, and with increasing ambiguity level, the profitability of the winner portfolio and the loser portfolio decrease. Neururer et al. (2016) showed that, according to the Bayesian learning model, after the seasonal earnings announcement, the uncertainty (ambiguity) is reduced on average; also, the size of the unexpected earnings affects the amount of uncertainty being resolved, and the unexpected large earnings, earnings that deviate greatly from the expected amount increase uncertainty. Anagnostopoulou and Isekrekos (2017) found that lower quality of information was associated with greater variations in the implicit volatility of options and companies with weaker future economic performance will have more uncertainty. Liu et al. (2018) found that ambiguity has a positive effect on the stock price reaction to earnings announcement, and ambiguity has a greater impact than market-level ambiguity on the effectiveness of earnings announcement premium, and the asymmetric effect of news on stock returns decreases with firm-level ambiguity. Brenner and Judah (2018) show that ambiguity in stock market has value. Introducing ambiguity alongside risk provides stronger evidence for the role of risk in explaining expected returns in stock markets, and the aversion level or interest in ambiguity by investors depends on the expected desirable return. Lee et al. (2019), in their research entitled the role of ambiguity risk factor in predicting returns examined the relationships between mentioned variables. The results indicated a negative relationship between ambiguity risk factor and future stock returns, in addition, disclosure of information has a moderating role in the relationship between these variables.

3. Methodology

The present study is in the field of applied researches, in terms of nature is descriptive and in terms of method it is also in the category of correlation researches. To collect data and information, the library method and in the research data section, referring to financial statements, explanatory notes and stock exchange magazine have been used. Descriptive and inferential statistics were used to describe and summarize the data collected. In order to analyze the data, variance heterogeneity pre-test, F Limer test, Hausman test and Jarque-Bera test and then multivariate regression test were used to confirm and reject the research hypotheses (EVIEWS software).
Considering the research title and the theoretical framework presented, the research hypotheses are presented as follows:

Hypothesis One: Earnings announcement premium for companies with a high level of ambiguity is more than those with a low level of ambiguity.

Hypothesis 2: Investors react differently to earnings good and bad news, and this difference decreases with the level of company ambiguity.

3.1. Statistical population and sample selection

The statistical population of this research is the companies listed in Tehran Stock Exchange were present during the years 2013-2017 in Tehran Stock Exchange. Using purposive sampling, 120 companies were selected as sample and for each variable of this study, 600 data-year selected to test statistical hypotheses.

3.2. Research Model and variables

In the present study, based on Williams (2015) research, for the first hypothesis, the regression model (1) is formulated:

(1)

$$RET(-1,1)_{i,t} = \alpha + \beta 1\ Amb+_{i,t} + \beta 2\ SIZE_{i,t} + \beta 3\ MTBi,t + \beta 44\ MOMi,t + \varepsilon t$$

In the mentioned model:
RET(-1,1)i,t: An abnormal seven-day cumulative return around the earnings announcement of the company i in period t;
Amb: The ambiguity of company i in period t;
SIZE: Size of company i in period t;
MTB: Market value to book value of stock of company i in period t,
MOM: Momentum of company i in period t,

To test the second research hypothesis, model (2) is also presented:

(2)

RET(-1,1)i,t = α + β1SUE+ i,t + β2 SUE- i,t +β3 SIZE i,t + β4 MTBi,t + β5 MOMi,t + εt

SUE+: Earnings good news
SUE-: Earnings bad news

3.2.1. Research dependent variable

A- Earnings announcement premium

The abnormal seven-day accumulated returns around the earnings announcement RET (-1.1) i, t, deviation or error in forecasting stock returns are called abnormal returns. In fact, the abnormal returns originate from the difference between the actual returns and the expected returns:

$$AR_{it} = R_{it} - E(R_{it})$$

In which E (R_{it}) is the expected returns of stock i, in day t, which is calculated as follows:

$$E(R_{it}) = \alpha_i + \beta_i R_{mt}$$

R_{it} : the real stock returns which is calculated as follows:

$$R_{it} = \frac{(1+\alpha)P_{t+1} + D - P_t}{P_t}$$

α: percentage of earnings increase; 1Pt+: price in the time 1t+; P_t : price in the time t; D: paid cash earnings.
R_{mt} : Daily market returns calculated using the following formula:

$$R_{mt} = \frac{TEDPIX_{t+1} - TEDPIX_t}{TEDPIX_t}$$

In which, TEDPIX t is the cash price index, then using the Capital Assets Pricing Model, the expected returns is calculated:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_i$$

Using the least squares, α and β are estimated for each company and each year separately, given estimated α and β and regardless of the estimation error E (Rit), the expected return on model (4) is calculated. Also, to test the research hypotheses, we need to obtain these calculated abnormal returns for the periods around the dividend announcement news, which in this study is 7 days (3 days before to 3 days after the dividend announcement), so in the following equation we have:

$$CAR^{i}_{-1,+1} = \sum_{t=-1}^{+1} AR_{it}$$

B- Independent variable

Company Ambiguity (Amb): Based on Farokhri and Pitehnoyi (2017) study, the information environment factor is measured and by increasing the mentioned factor, the amount of environmental information quality is increased and consequently the ambiguity decreases, so the higher amounts of the above factor indicates less ambiguity, so the factor inversion of *IE – Index* is equivalent to Amb (company ambiguity) and is as follows:

$$\text{Amb} = 1/\ IE - Index$$

IE- Index_{it} = 0.112 P_1 + 0.095 P_2+0.129 P_3 + 0.107 P_4 + 0.117 P_5 + 0.063 P_6 + 0.085P_7 + 0.113 P_8 +0.096 P_9 + 0.082 P_{10}

IE – Index: the Information Environment Factor
P: The standardized factor of calculating information environment criteria is:

1) Suggested Purchase Price Range (P1): Calculated using the following formula:

$$\text{SPREAD}_{it} = \frac{1}{D_{it}} \sum_{1}^{D_{it}} \frac{(ASK_i - BID_i)}{(ASK_i + BID_i)/2}$$

SPREAD_{it} : Suggested Price Range of company i, in the year t; ASK_i, is average best suggested monthly stock sales price of company i, BID_i, average best suggested monthly stock purchase price of company i and Dit, is the number of periods of the year t in which the latest suggested purchase price and latest suggested sales price for the stock of the company i, is available.

2) Frequency of Turnover (P_2): The turnover is the number of stock traded divided by the total number of stock.
3) Amihud non-liquidity criterion (P_3) calculated using the following equation:

$$ILLIQ_{it} = \frac{1}{Dit}\sum_{1}^{Dit}\frac{|Ri|}{VOLi} \times 10000$$

ILLI: the non-liquidity of the company i, in the year t;
|*Ri* |: Absolute magnitude of stock returns of company i;
VOL: The Rial volume of the company i;
Dit: the number of periods of the year t, in which the stock of the company i, has been transacted.

4) The size of the company (P_4) is equal to company market value logarithm
5) The company growth opportunities (P_5) is Tobin's Q Ratio which is calculated by the following equation:

Tobin's Q = (MVCS + BVPS + BVLTD +BVINV + BVCL – BVCA)/ BVTA

MVCS: market value of common stock, BVPS: book value of preferred stocks, BVLTD: book value of receipt long-term financial facility; BVINV: book value of inventory; BVCL: book value of current liability; BVCA: book value of current assets; BVTA: book value of total assets.

6) Volatility of stock returns (P_6) which is calculated by the following equation:

$$Volatility_{it} = \sqrt{\frac{1}{D_{it}^{-1}}\sum_{1}^{Dit}(R_i - \bar{R})}_{2}$$

$Volatility_{it}$: the volatility of the stock returns of company i, in the year t;
R i : is the stock returns of the company that if Pt is the final price, is calculated by model (15):

$$R_{i=} \frac{P_t - P_{t-1}}{P_{t-1}}$$

D: is the number of the periods of the year which is calculated for that stock returns.

7) The earnings forecast error (P_7): is calculated by the following equation:

$$FE = \frac{|ACT_t - EST_t|}{|ACT_t|}$$

FE: indicates the earnings forecast error; ACTt, is actual earnings per share, and ESTt is earning forecast average of managers.

8) Institutional ownership (P_8): is divided from the total stocks owned by banks and insurances, holdings, investment companies, retirement funds, capital provider companies and investment funds, public organizations and institutions, and public companies to total distributed stocks of the company and the percentage or the amount of the institutional ownership is obtained.
9) The number of the shareholders of the company (P_9)
10) The life of the company (P_{10}) that is difference logarithm of the founding date of the company since current year.

Using each of the factors can cause disturbance in measuring the informational environment, therefore, a harmonic composite index is used that decreases the skewness of single use of each of informational environment criteria and provides most accurate criterion for test.

C- Earnings news (SUE):

1) SUE^+: the earnings good news if be positive SUE, is equal to 1, otherwise is equal to 0.
2) SUE^-: the earnings good news if be negative SUE, is equal to 1, otherwise is equal to 0 which is calculated using the following equation:

$$SUE = \frac{A_q - F_q}{P_q}$$

Aq: actual earnings per share, Fq: forecasted earnings per share, Pq: earnings per share at the end of the period.

Control variables

- Size of the company ($Size_{i,t}$): which is market value logarithm.
- Market value to book value (MTB)

- Momentum (MOM): which is average stock returns over the past 9 months

4. Results

4.1. Descriptive statistics of research variables

Before testing the hypotheses, the variables are summarized in Table (1) and (2):

In this table we seek to make the descriptive findings of variables significant. In Tables (1) and (2), the mean for abnormal returns (earnings announcement premium) at high ambiguity level and abnormal returns (earnings announcement premium) at low ambiguity level are 1.73 and 1.78, respectively. The median for abnormal returns (earnings announcement premium) at high ambiguity level and abnormal returns (earnings announcement premium) variables at low level of ambiguity are 1.98 and 1.89, respectively.

The standard deviation for the abnormal returns (earnings announcement premium) at high ambiguity level and abnormal returns (earnings announcement premium) variables at low ambiguity level are 2.94 and 2.66, respectively. The skewness is positive and near zero for the stability reporting variable, indicating a normal distribution and very low skew to the right. Dispersion index, elongation curve or curve bevel, frequency to curve, and standard normal has positive elongation for all variables.

Table (1): Descriptive statistics of variables examined at high ambiguity level

	Abnormal returns	Company ambiguity	Earnings good news	Earnings bad news	Company size	market value to book value	momentum
average	1.730063	0.381708	0.558333	0.441667	14.13558	4.148104	0.053958
mean	1.980000	0.380000	1.000000	0.000000	14.02500	2.750000	0.030000
maximum	9.540000	0.500000	1.000000	1.000000	19.96000	121.1900	0.410000
minimum	-6.160000	0.300000	0.000000	0.000000	11.56000	0.410000	-0.090000
Standard deviation	2.946586	0.038157	0.497104	0.497104	1.189501	7.972052	0.077239
skewness	-0.071176	0.522872	-0.234938	0.234938	1.158727	9.944044	1.463973
elongation	2.804271	2.992953	1.055196	1.055196	5.738895	124.8100	5.805736
Jarque-Bera test	1.171480	21.87263	80.06093	80.06093	257.4427	304664.2	328.9004
Significance level	0.556694	0.000018	0.000000	0.000000	0.000000	0.000000	0.000000
observations	480	480	480	480	480	480	480

Table (2): Descriptive statistics of variables examined at low ambiguity level

	Abnormal returns	proxy	Earnings good news	Earnings bad news	Company size	Market value to book value	momentum
average	1.783917	0.271833	0.508333	0.491667	15.54300	5.052333	0.048750
mean	1.890000	0.290000	1.000000	0.000000	15.20500	3.640000	0.030000
Max.	9.930000	0.340000	1.000000	1.000000	19.51000	42.64000	0.270000
Min.	-7.330000	0.010000	0.000000	0.000000	11.36000	0.280000	-0.070000
Standard deviation	2.666395	0.068526	0.502027	0.502027	1.755317	5.137097	0.066555
skewness	-0.341430	-2.126194	-0.033338	0.033338	0.233203	3.882022	0.916950
elongation	3.531205	7.394974	1.001111	1.001111	2.304117	26.06139	3.598709
Jarque-Bera test	3.742383	186.9930	20.00001	20.00001	3.508937	2960.541	18.60820
Significance level	0.153940	0.000000	0.000045	0.000045	0.172999	0.000000	0.000091
observations	120	120	120	120	120	120	120

4.2. Reliability test of research variables

In this study, we used the Augmented Dickey Fuller (ADF) unit root test presented in Table (3):

According to Table (3), the absolute value of the Dickey Fuller statistic is greater than all the critical values at different confidence levels, so all variables are at the reliable level. This means that the mean and variance of the variables over time and the covariance of the different variables have been constant in High-level ambiguity and Low-level ambiguity. Variables, abnormal returns, company ambiguity agent variable, earnings good news, earnings bad news, company size, market value to book value, momentum is significant. As a result, using these variables in the model does not lead to false regression.

Table 3: Augmented Dickey Fuller (ADF) unit root test results

Critical values at various confidence levels			Dickey Fuller statistic	Abbreviations	variable	
1%	5%	10%				
-3.443776	-2.867354	-2.569929	-21.84447	RET	Abnormal returns	High-level ambiguity
-3.443776	-2.867354	-2.569929	-13.67117	Amb	Company ambiguity agent variable	
-3.443776	-2.867354	-2.569929	-19.45896	SUM^+	Earnings good news	
-3.443776	-2.867354	-2.569929	-19.29230	SUM^-	Earnings bad news	
-3.443776	-2.867354	-2.569929	-8.648697	SIZE	Company size	
-3.443776	-2.867354	-2.569929	-19.05252	MTB	Market value to book value	
-3.443892	-2.867405	-2.569956	-9.583493	MOM	momentum	
-3.486064	-2.885863	-2.579818	-9.733447	RET	Abnormal returns	Low-level ambiguity
-3.486064	-2.885863	-2.579818	-9.061452	Amb	Company ambiguity agent variable	
-3.486064	-2.885863	-2.579818	-9.544192	SUM^+	Earnings good news	
-3.486064	-2.885863	-2.579818	-9.208308	SUM^-	Earnings bad news	
-3.486064	-2.885863	-2.579818	-5.739714	SIZE	Company size	
-3.486064	-2.885863	-2.579818	-8.238542	MTB	Market value to book value	
-3.486064	-2.885863	-2.579818	-12/43732	MOM	momentum	

4.3. Model Pattern Correlation Test

In this study the results of correlation test are presented in Table (4):

According to Table (4), when the correlation coefficient is less than 0.5 there is no linearity between the independent variables; and if the correlation coefficient is between 0.5-0.75, it shows that in this case, linearity is also negligible. As a result, correlation coefficient in all of variables, abnormal returns, company ambiguity agent variable, earnings good news, earnings bad news, company size, market value to book value, momentum is less than normal and linearity is negative.

Table 4: Results of the research model pattern correlation

	Earnings announcement premium	ambiguity	Earnings good news	Earnings bad news	Size of the company	Market value to book value	momentum
Abnormal returns	1						
Ambiguity proxy	0.0631	1					
Earnings good news	-0.0458	0.0986	1				
Earnings bad news	0.0458	-0.0986	-0.0345	1			
Size of the company	-0.0409	-0.3813	0.0939	-0.0939	1		
Market value to book value	0.0317	-0.0638	0.0096	-0.0096	-0.0497	1	
momentum	0.1397	0.0742	-0.1022	0.1022	-0.0614	-0.0940	1

4.4. Correlation test of research variables

In this study the results of correlation test are presented in Table (5):

Absence of autocorrelation is one of the classical assumptions we consider for convenience in calculations. But if the regression has a self-correlation problem, or if we have a delayed dependent variable on the right side of the equation, we use this test. Based on the values presented in Table 6, there is no self-correlation between the first and second hypotheses.

Table 5: the results of correlation test between independent variables for research hypotheses

	Earnings announcement premium	ambiguity	Earnings good news	Earnings bad news	Size of the company	Market value to book value	momentum
Abnormal returns	1						
Ambiguity proxy	0.0631	1					
Earnings good news	-0.0458	0.0986	1				
Earnings bad news	0.0458	-0.0986	-0.0345	1			
Size of the company	-0.0409	-0.3813	0.0939	-0.0939	1		
Market value to book value	0.0317	-0.0638	0.0096	-0.0096	-0.0497	1	
momentum	0.1397	0.0742	-0.1022	0.1022	-0.0614	-0.0940	1

4.5. Variance Heteroscedasticity Test

In this study, the results of the White test are presented in Table (6):

Table 6: The results of White test between independent variables for research hypotheses

		Statistic type	Statistic value	probability
First hypothesis	High-level ambiguity	F statistic	0.909101	0.5489
	Low-level ambiguity	F statistic	1.183006	0.2992
Second hypothesis	High-level ambiguity	F statistic	1.034559	0.3274
	Low-level ambiguity	F statistic	1.324795	0.0917

Source: (researcher findings)

4.6. Lack of Autocorrelation Test

In this study the results of lack of autocorrelation test are presented in table (7):

Autocorrelation, also known as serial correlation, is the correlation of a signal with a delayed copy of itself as a function of delay. Informally, it is the similarity between observations as a function of the time lag between them. The analysis of autocorrelation is a mathematical tool for finding repeating patterns, such as the presence of a periodic signal obscured by noise, or identifying the missing fundamental frequency in a signal implied by its harmonic frequencies. According to values presented in table (7), there is no autocorrelation in the first and second hypotheses.

Table (7): the results of correlation test between independent variables for research hypotheses

		Statistic type	Statistic value	probability
First hypothesis	High-level ambiguity	F statistic	1.561449	0.2109
	Low-level ambiguity	F statistic	0.333344	0.7172
Second hypothesis	High-level ambiguity	F statistic	1.812060	0.1645
	Low-level ambiguity	F statistic	1.014485	0.3659

Source: researcher findings

4.7. Summary of analyzes by individual hypothesis

4.7.1. first hypothesis test

Hypothesis 1 – Earnings announcement premium in companies with high levels of ambiguity is more than that of companies with low level of ambiguity.

The results of the first hypothesis are presented in Table (8):

In Table (8), the probability of t statistic for coefficients of ambiguity proxy and momentum variables on abnormal returns in companies with high ambiguity level and ambiguity proxy, market value to

book value and momentum variables on abnormal returns in companies with low ambiguity level is less than 5%; therefore, the above relationship is statistically significant. The proxy coefficient of abnormal returns in companies with high ambiguity level is 7.83 and in abnormal returns in companies with low ambiguity level is 7.39. The probability of t statistic for market value to book value and company size variables on abnormal returns in companies with high ambiguity level and company size variables on abnormal returns in companies with low ambiguity level is more than 5%. Therefore, the coefficient of the above variables is not statistically significant, so with 95% confidence this variable is non-significant in the regression model. Adjusted determination coefficient indicates the explanatory power of the independent variables that are able to explain 53% and 52% of the dependent variable changes in high and low ambiguity companies, respectively. The probability of F statistic indicates that the whole model is statistically significant. According to the hypothesis, because the measures proxy variable of the company ambiguity, the abnormal return is 7.83 in high-level ambiguity companies and 7.39 in low-level ambiguity companies, so the null hypothesis is rejected; it means that the earnings announcement premium for high-level ambiguity companies is more than that of low-level ambiguity companies.

Table 8: Results of the first hypothesis test

Explanatory variables name	High-level ambiguity			Low-level ambiguity		
	coefficients	t-statistic	Significance level	coefficients	t-statistic	Significance level
y-intercept	-2.034978	-0.751505	0.4527	-0.017651	-0.010301	0.9918
Company ambiguity	7.831731	2.075864	0.0384	7.394624	2.563907	0.0116
Size of the company	0.028208	0.232047	0.8166	0.009975	0.090489	0.9281
Market value to book value	0.026674	1.634394	0.1028	-0.115660	-2.067858	0.0409
momentum	4.994988	2.977647	0.0031	5.512121	2.012657	0.0465
Determination coefficient	0.532283			0.539456		
Adjusted determination coefficient	0.528344			0.523437		
F-statistic	3.961443			4.659110		
F-statistic probability	0.003574			0.001602		
Durbin-Watson statistic	2.007946			1.911015		

4.7.2. Second hypothesis test

Hypothesis 2 - Investors react differently to good and bad news, and this difference decreases with increasing ambiguity level.

The results of the second hypothesis are presented in Table (9):

In Table 9, the probability of t-statistic for coefficients of earnings good news and bad news, and momentum on abnormal returns in high- and low-ambiguity level companies is less than 5%; therefore, the above correlation is statistically significant and earnings good news and bad news coefficient on abnormal returns in high-ambiguity level companies is -2/6 -(-2/68) >0 and earnings good news and bad news variables on abnormal returns in low-ambiguity level companies is 2/17 -(-2/48) >0 . The probability of t statistic for market value to book value and company size variables on abnormal returns in high- and low-level ambiguity companies is more than 5%. Therefore, the coefficient of these variables is not statistically significant, so with 95% confidence this variable is non-significant in the regression model. Adjusted determination coefficient indicates the explanatory power of the independent variables that are able to explain 53% and 52% of the dependent variable changes in high and low level ambiguity companies, respectively. The probability of F statistic indicates that the whole model is statistically significant. Given the hypothesis, because the earnings good news and bad news variables on abnormal returns in high-ambiguity level companies is

-2/6 -(-2/68) >0 and the earnings good and bad news on abnormal returns in low-ambiguity level companies is 2/17 -(-2/48) >0, so the null hypothesis is rejected, meaning that investors react differently to

earnings good and bad news and this difference decreases with the ambiguity level of the company.

Table (16-4) shows that the significance level of Levene's test for earnings announcement premium and earnings good news, is less than 5%. Therefore, to conclude earnings announcement premium and good news, the inequality of variances assumption is used and for earnings bad news, the significance level of Levene's test is more than 5%, so to conclude the earnings bad news, the equality of variances assumption has been used. To test the significance of the average difference of earnings announcement premium, earnings good and bad news, two different high and low levels of ambiguity have been used. Table (16-4) presented the results of average equality test of these ratios along with information on the average of earnings announcement premium, earnings good and bad news. Since the significance level of t-test in earnings announcement premium, earnings good and bad news is less than 0.05, so the above correlation is statistically significant, it means that average earnings announcement premium, earnings good and bad news is significant. So the hypothesis H0 is rejected, namely the earnings announcement premium, earnings good and bad news, at both high and low ambiguity levels is different.

Table 9: Summary of the results of the second hypothesis test

Explanatory variables name	High-level ambiguity			Low-level ambiguity		
	coefficients	t-statistic	Significance level	coefficients	t-statistic	Significance level
y-intercept	5.063199	2.634594	0.0087	-0.847977	-0.453063	0.6514
Earnings good news	-2.679101	-2.310376	0.0213	-2.476030	-2.590024	0.0108
Earnings bad news	-2.600407	-2.240361	0.0255	2.168887	2.272065	0.0250
Size of the company	-0.075591	-0.691027	0.4899	0.042438	0.388088	0.6987
Market value to book value	0.023712	1.459508	0.1451	-0.109381	-1.955588	0.0530
momentum	5.278839	3.128747	0.0019	6.412642	2.307565	0.0228
Determination coefficient	0.534382			0.541172		
Adjusted determination coefficient	0.529470			0.521047		
F-statistic	3.375492			3.747816		
F-statistical probability	0.005244			0.003531		
Durbin-Watson statistic	1.997911			1.913265		

Table 16-4: The results of ratios average equality test

		Levene's test		Average observations		t-test average equality		
		F-statistic	Significance level	High-level ambiguity	Low-level ambiguity	Average difference	t-statistic	Significance level
Earnings announcement premium	Variance equality assumption	25.102	0.000	0.3817	0.2718	0.10987	23.489	0.000
	Variances inequality assumption						16.921	0.000
Earnings good news	Variance equality assumption	4.28	0.039	0.5938	0.4917	0.10208	2.026	0.043
	Variances inequality assumption						2.001	0.047
Earnings bad news	Variance equality assumption	2.766	0.097	0.4167	0.5250	-0.10833	-2.144	0.032
	Variances inequality assumption						-2.123	0.035

5. Discussion and Conclusions

The purpose of this study was to investigate the role of accounting information on ambiguity aversion in companies listed in Tehran Stock Exchange. The results obtained in this study are in line with the documentations mentioned in the research theoretical framework and financial literature. In this regard, Liu et al. (2018) showed that ambiguity has a positive effect on the stock price reaction to earnings announcement and company ambiguity has a greater impact than market-level ambiguity on the effectiveness of earnings announcement premium; which is in line with the results of the present study. The results of the first hypothesis of the study show that the earnings announcement premium of companies is sensitive to ambiguity, arguing that investors will react more to earnings good news when company ambiguity is increased, but their reaction to earnings bad news when ambiguity of the company is lower, is stronger, and investors have ambiguous information about earnings prior to the earnings announcement, so investors in the ambiguous conditions have high premium demand for investment in these assets, so as expected, earnings announcement premium naturally increase as the ambiguity level increases. The results of the second hypothesis of the study show that investors react differently to earnings good and bad news and this asymmetry decreases with the ambiguity level of the company; it is argued that in uncertainty conditions, there is ambiguity about future status of the company and the capital market. In these circumstances, the entry of information signals, such as earnings announcement, can decrease uncertainty and lead to a revision of previous investor beliefs. Anyway, more accurate information signals have a stronger impact on investors' reaction; the research literature also shows that investors tend to show a different and asymmetric response to good and bad news. As investors often react more positively to bad news than good news in good time, conversely, investors react more positively to good news than bad news in bad time. In this regard, Veronesi (1999) believes that in bad times, bad news will have less of a negative impact on investors who have a bad status prediction and good news, although it can be positively received by market participants, can increase investors' uncertainty about the future status when confronted with each other, therefore, the results of the present study were obtained in line with the Veronesi (1999) model which suggested that investors react more strongly to bad news than good news, and this asymmetric effect decreases with ambiguity level of the company; in Iran, Kurdistani and Sepid Dast (2012) also showed that investors' reaction to earnings news was lower than expected and resulted in abnormal returns after earnings announcement. Liu et al. (2018) also showed that the asymmetric effect of news on stock returns decreases with ambiguity in company level, which is in line with the results of the present study. In the following, regarding the results presented in each hypothesis, the following suggestions are presented:

Based on the results of investigating the first hypothesis, it is recommended to consider reward and benefits for low-level ambiguity companies and penalties for high-level ambiguity companies in order to improve their position in terms of information quality and suitable information provision. Thus, the Tehran Stock Exchange can benefit from the consequences of company ambiguity (through optimal allocation of resources in the economy and information efficiency).

According to the results of investigating the second hypothesis, investors, shareholders and other capital market actors, especially those with little financial knowledge in analyzing financial reports, are suggested to consider information quality (information ambiguity) in decision-making on the purchase, holding or sale of shares of a company. It is recommended to researchers to consider the following topics in their future researches:

- The relationship between information ambiguity, price response delay, and future stock returns
- The impact of the type of market in which the company operates (first or second market) with the information ambiguity level.
- It is recommended that estimates be made by industry-based portfolios. The most important limitation of the present study is the lack of complete disclosure of information about the research variables. Information on all research variables for stock companies is not fully available. Therefore, in order to avoid bias in the results of the research, some years - companies were removed from the statistical sample and this reduced the sample size.

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