Identifying and Ranking Factors Affecting Earnings Response Coefficient

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Abstract

One of the most critical questions after financial statements is why market responses differ from companies with almost similar statements. This research aims to answer this question by identifying factors affecting the earnings response coefficient. In this research, all of these factors were identified, classified, and ranked for the first time in Iran. The researchers carried out the research using Fuzzy Delphi in two phases, and Shannon's Entropy was done. The cross-sectional method was used, and the data were collected over several weeks. The statistical population included 40 experts who have been active in the Iranian capital market for many years. The results revealed that 46 factors directly influence the earnings response coefficient in Iran. Finally, these factors were classified into five categories: the company's financial features and financial reporting, the company's market share, auditing quality, corporate governance, and environmental factors, then ranked with the aid of Shannon's Entropy.

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1. Introduction

Issuing any events containing company information, such as earnings announcements, affects stock prices and trading volume in the financial market. One of the indicators used to assess the importance of accounting information is the reaction of investors towards it when it is announced. The volatility of stock prices also increases during the release of the financial statements compared to previous periods. This reflects the market's response to stock prices to understand the Earning Response Coefficient (ERC) concept. The ERC reflects the market response to the company's published earnings information (Al-awawdeh, al-Sakini and Nour, 2020).

Since the first research published regarding the earnings response coefficient, one of the most critical issues was identifying factors affecting the earnings response coefficient in different companies. Research shows that we see different responses in the stock market for a unit of change in earnings or unexpected earnings. These studies cannot explain the behavioral abnormalities of shareholders in the capital market. In some cases, it is seen that companies with weaker financial reports and lower stock dividends yield much higher than companies with higher dividends. The question in this regard is why the market responds to the good and bad news of some companies more or less than other companies, and what factors cause the effect of profit valuation to be different between similar companies from the perspective of shareholders .The present study seeks to find the cause of this anomaly by identifying other stimuli affecting shareholders' responses in Tehran Stock Exchange.

In this study, first, all the factors affecting the earnings response coefficient were extracted by using library methods and studying the research background, then by performing two rounds of Fuzzy Delphi, and with the expert's opinions, these factors were validated and classified. Then the rank of each index was determined by using Shannon's Entropy.

Policymakers have turned direct liquidity to the capital market into a macroeconomic policy with liquidity growth. If investors fail in this market, they will lose trust in the capital market and prefer not to invest in the stock market. Consequently, one of the factors that can lead to distrust in investment is the lack of awareness of the parameters affecting the capital market. Therefore, it is necessary to identify all factors affecting the capital market.

The innovation aspect of research is as follows: the studies conducted so far have examined only specific factors affecting the earnings response coefficient; therefore, many effective variables were understudied, and the perspectives presented were partial and not comprehensive. However, this research tried to identify, extract, classify, and rank all effective factors on the Iranian stock market for the first time. The researchers studied the issue from different dimensions and considered all determinants and their effect on stock market reaction.

The results of the research can be helpful to for Tehran Securities and Exchange Organization, stockbrokers, investment funds, the Ministry of Economic Affairs and Finance, analyzers and activists of the capital market, investment managers, postgraduate students of accounting, financial management, financial engineering, behavioral economy researchers, and other activists of the capital market.

2. Theoretical foundation

One of the essential experimental studies related to financial accounting after financial reporting is determining a criterion to examine different responses to earnings. This is called the earnings response coefficient. There is no agreed-upon definition for this expression, and different definitions are provided. The simple definition is that ERC is the coefficient of variable profit in the regression of returns and profits (Penman, 1992). However, the most common definitions are ERC,

a variable of unexpected profit in the regression of abnormal returns and unexpected profit (Collins and Kotari, 1989). ERC measures the abnormal return in response to unexpected earnings of a securities issuer (Scott, 2006). ERC is the unexpected earnings variable in abnormal returns and unexpected earnings (Ariff, Fah and Ni, 2013). ERC is an assessment of investors that starts around the date of the company's earnings announcement, where investors give different responses to reported earnings (Danier Paramita et al., 2020). The common aspect of all definitions and studies related to ERC is measuring investors' responses (Behbahaninia and Mashayekhi, 2016). It is worth mentioning that the previous studies focused only on the declared earnings without considering other factors and parameters affecting investors' responses. However, as researchers started to examine more deeply, other parameters involved in investors' behaviour after the earnings announcement were also addressed.

The efficient-market hypothesis confirms the existence of ERC. This theory states that issuing company financial information immediately affects prices and causes prices to adjust. In other words, share prices reflect all information in an efficient market. As a result, we see significant changes in stock prices and trading volumes when publishing earnings announcements, but a few days after the announcement, no effect can be seen even though the news still exists.

Signaling theory is a relevant theory to ERC. This theory states that financial reports contain information about the company's future, signal to external parties, and are very effective investor decisions. For this reason, information asymmetry causes different investor behaviors around the issuing of financial reports. This confirms the existence of ERC.

In 1968, Ball and Brown studied a sample of 261 New York stock companies over nine years, from 1957 to 1965. Their goal was to explore the relationship between companies' stock price (returns) and accounting earnings. They only considered the net profit and ignored other factors. Ball and Brown's first step was to examine the content of earnings information as to whether the reported earnings exceeded expectations. This requires a criterion to measure market expectations. The criterion used in the Ball and Brown (1968) studies is the difference between this year's earnings and the previous year's earnings. A company that makes more profit than the previous year is considered good news, and a company that makes less profit than the previous year is considered bad news. They classified all the companies with good news announcements in one group. The average unusual return in this group was significantly positive during the issuance of financial statements. Conversely, companies with bad news announcements had an unusually negative average return. This research provides plausible evidence that the market responds to good and bad profit news (Scott, 2006). The next logical step is to ask how the unexpected profit's magnitude relates to the stock market response. The most important result of their research is the earnings response coefficient. Since that time, most financial accounting research in the capital market has been to discover and explain the different responses of the market to new information.

2.1. Research background

Forouzandeh, Izadinia and Karimzadeh (2020) showed a significant relationship between abnormal stock return acquisition and unexpected earnings and the pre-opinion paragraphs. However, audit report type does not affect the quality of financial statements and abnormal stock returns.

Takamatsu and Lopez (2019) revealed that the ability of earnings to change the stock price for the unspecified environment of accounting decreases. They showed that accepting international financial standards can increase accounting quality and bring about a positive response from the market toward the issue of financial information. They found that small firms with lesser prices will

respond more toward financial information than large firms with higher prices.

Wijaya et al. (2020) studied the effect of social responsibility disclosure, profitability, and sales growth on the earnings response coefficient in the Indonesia Stock Exchange from 2015 to 2017. The sample included 52 manufacturing companies. Through examining audited financial statements, they found that the effect of social responsibility on ERC is much higher than other factors.

Ebrahimi Sarvolia et al. (2017) studied the effect of domestic factors, including factors related to the stock exchange and company, and external factors, including economic, psychological, and political. They concluded that external factors (economic, psychological and political) strongly influence the response of stakeholders, and their influence was much more than internal factors. Also, among external factors, the political factor has explained the external dimension. This means that the comments and statements of political officials will change the course of transactions and create a wave more than economic factors.

Hakimipour (2017), inspired by Collins and Kothari's (1989) model, studied risk-free interest rates, systematic risk, growth opportunities, and financial leverage in the Iranian stock market. The results revealed that the prescriptive interest rate in Iran does not significantly influence the earnings response coefficient. As Collins and Kothari(1989) stated, systematic risk has a negative effect on the earnings response coefficient. In addition, growth opportunities and financial leverage have positive and negative effects on the earnings response coefficient.

Vakilifard, Saeedi and Eftekhari (2013) concluded a significant relationship between the earnings response coefficient and the level of stock returns. They found that high-return companies' returns are more than expected compared to low-return companies regarding good news. Also, low-return companies' response coefficient is more than expected compared to high-return companies regarding bad news.

Findings by Gajewski and Bertrand (2013) illustrated that the proposed price limit of the stock exchange is broader at the time of interim earnings announcement compared to the annual earnings announcement, and non-disclosure does not help reduce information symmetry. Moreover, the fault level of net profit and its constructs is most probably related to the major role of institutional shareholders in the companies.

Yahyazadehfar, Zali and Shababi (2009) found that the effect of political, psychological and economic factors is 62%, 53%, and 47%, respectively. They are the most important determinants of shareholders' behavior. They also found that political and psychological factors indirectly influence the behavior of shareholders by determining the interest rate.

Tehrani and Khoshnoud (2005) studied the significance of fiscal and non-fiscal information and found that non-fiscal information like management method, political issues, domestic and international economy, sales volume, and industry type are more effective on shareholders' behavior.

Collins and Kothari (1989) tested the influence of cross-sectional elements on the earnings response coefficient. They found that temporal variation (the difference in earnings response coefficient as time passes) directly relates to the interest rate. They also illustrated that cross-sectional variation (the difference in earnings response coefficient in companies) has a positive relationship with earning continuity and a negative relationship with systematic risk. Nevertheless, they proposed the assumption that growth opportunities, which are not completely reflected in earning continuity, have a positive relationship with the earnings response coefficient. Finally, they showed that if the firm size differs from the accounting environment, firm size will affect the relationship between earnings and efficiency.

2.2. Research questions

The main research questions are as follows:
- What factors affect the earnings response coefficient in Iran?
- What is the weight of each indicator affecting the earnings response coefficient?

3. Research methodology

First, with documentary and library research methods, previous literature and articles were studied to achieve the research objectives, and 70 factors influencing the earnings response coefficient were extracted (Table 3). Next, according to the experts, the fuzzy Delphi method was utilized to screen and identify ultimate indices. Hence, a questionnaire and interview were prepared to validate and approve the subject under investigation in Iran's capital market. Then there were made available for the expert panel of the capital market. After conducting the specialized interview and collecting the experts' answers, another questionnaire was prepared according to the extracted information to achieve an agreement within the expert panel and execute other phases of the fuzzy Delphi method (Table 4). After completing the remaining phases of the fuzzy Delphi method, factors capable of influencing the earnings response coefficient in Iran were identified. These factors were then categorized into 5 groups considering the experts' opinions, and Shannon's Entropy was utilized to determine a weight for the parameters in each category (Table 5).

The research population consists of 40 experts working directly in the fields under investigation and fields associated with Iran's capital market and experts with related proficiency, experience, and occupation. This population includes reputable senior and middle managers, analyzers in investment companies, CEOs of Portfolio management Companies, academics, and senior experts in the capital market. After creating the research population, the variables were extracted and identified.

Table 1. Descriptive characteristics of the expert panel

Row	Education			Field of Study			Experience (year)		
	Description	Fi	%	Description	Fi	%	Description	Fi	%
1	Bachelor	13	32.5	Accounting and Finance	22	55	Between 5 and 10	5	12.5
2	M.A	20	50	Management and Economics	15	37.5	Between 10 and 15	24	60
3	P.H. D	7	17.5	Other	3	7.5	More than 15	11	27.5
Sum	-	40	100	-	40	100	-	40	100

Although experts use their competencies and mental skills to conduct the comparisons, the traditional process of quantifying people's views is not completely capable of reflecting human belief. It will be complicated if the valuation is not based on mathematical language and formulas. Fuzzy logic is a process that replaces ways that require mathematical processes with the opinion of an expert.

In other words, fuzzy sets are highly consistent with verbal explanations and sometimes imprecise humans, and therefore, it is better to use fuzzy sets for making long-term predictions and decisions in the real world (Kahraman, 2008). In this study, experts' opinion was fuzzified by triangular fuzzy numbers. The experts' opinion was gathered considering the significance of each index and with the aid of a fuzzy spectrum with a 9-point scale.

Table 2. Fuzzy spectrum with 9- point scale for the valuation of indices

Linguistic variable	Fuzzy amount	triangular fuzzy equivalent
Too insignificant	$\tilde{1}$	(1،1،1)
Too insignificant to insignificant	$\tilde{2}$	(1،2،3)
insignificant	$\tilde{3}$	(2،3،4)
Insignificant to average significant	$\tilde{4}$	(3،4،5)
Average	$\tilde{5}$	(4،5،6)
Average to significant	$\tilde{6}$	(5،6،7)
Significant	$\tilde{7}$	(6،7،8)
Significant to too significant	$\tilde{8}$	(7،8،9)
too significant	$\tilde{9}$	(9،9،9)

In the next step, the average fuzzy aggregate will be calculated; each triangular fuzzy number, as a result of experts' opinion aggregation, can be calculated as follows for index j:

$$\iota_j = \left(L_j . M_j . U_j \right)$$
$$L_j = \min(X_{ij})$$
$$M_j = \sqrt[n]{\prod_{i=1}^{n} X_{ij}}$$
$$U_j = \max(X_{ij})$$

Formula 1

Index i denotes the experts. In other words:
- X_{ij}: Assessment value by expert i from index j
- L_j: The minimum assessment value for index j
- M_j: Geometric mean of assessment value by experts from the performance of index j
- U_j: Maximum value of assessments for index j (Cheng, Lee and Tang 2009)

There are numerous methods introduced to aggregate the opinion of respondents. These are experimental methods that numerous researchers propose. According to one of the traditional methods Wu and Fang (2011) proposed, a set of triangular fuzzy numbers is f to fuzzified by considering the minimum value l, geometric mean m, and maximum value u. Fuzzy c-means (Formula 4) have been utilized in this study.

$$F_{AGR} = (\min\{I\} . \prod\{m\} . \max\{u\})$$ Formula 2
$$F_{AGR} = \left(\min\{I\} . \left\{\frac{\sum m}{n}\right\} . \max\{u\} \right)$$ Formula 3
$$F_{AVE} = \left(\left\{\frac{\sum l}{n}\right\} . \left\{\frac{\sum m}{n}\right\} . \left\{\frac{\sum u}{n}\right\} \right)$$ Formula 4

Defuzzification

Usually, the aggregation of average triangular fuzzy numbers can be abstracted by a definite value that is the best related mean value. These processes are called defuzzification. There are numerous methods for defuzzification. In most cases, the following simple method is utilized for defuzzification:

$$F_{ave} = (L . M . U)$$
$$x_m^1 = \frac{L+M+U}{3} . x_m^2 = \frac{L+2M+U}{4} . x_m^3 = \frac{L+4M+U}{6}$$ Formula 5
$$\text{Crisp number} = \max(x_{max}^1 . x_{max}^2 . x_{max}^3)$$

The values of x_{max}^i are not differing significantly, and the values are always close to M. M is the average aggregation of possible values of m from triangular fuzzy numbers. Nevertheless, the

largest certain value x_{max}^i is considered (Bojadziev and Bojadziev, 2007). The defuzzified values (Crisp number) larger than 7 are accepted, but any index with a value smaller than 7 is rejected (Wu and Fang, 2011).

Shannon's Entropy

In the next step, the weight of each index in each category is determined with the aid of Shannon's entropy. Shannon's entropy can strongly process the data associated with content analysis. There are numerous approaches to determining the weight of indices, one of which is Shannon's entropy (Azar, 2001). According to this approach, the number of each index is counted according to the subject and commensurate with each response. Next, the significance of each index is calculated by using the information content of each subject. In this research, Shannon's entropy is used to determine each index's weight considering its simplicity and strength due to various indices and uncertain conditions. Firstly, a decision matrix is formed to use Shannon's entropy in the decision matrix; columns are the criteria, and rows present options. For example, the X12 is the score of the first option compared to the second criterion.

$$X_{ij} = \begin{bmatrix} x_{11} & x_{12} & ... & x_{1n} \\ x_{21} & x_{22} & ... & x_{2n} \\ ... & ... & ... & ... \\ x_{m1} & x_{m2} & ... & x_{mn} \end{bmatrix}$$ Formula 6

Then, the above matrix is normalized. During the normalization process, the component of each column is divided by the total value of each column. Each normalized component is depicted by pij. After normalization, each index's entropy (EJ) is calculated using the following formula. K is a constant value, and entropy is kept between 0 and 1.

$$E_j = -\mathrm{K}\sum_{i=1}^{m} P_{ij} \times Ln\, P_{ij} \quad i = 1.2.....m$$ Formula 7

Afterwards, the deviation ratio (dj) is calculated as follows: dj=1-Ej (Formula 8), and this shows how much useful information related index (dj) is given to the decision-maker for decision-making. If the measured values of indices are close to each other, they show that rival alternatives are not significantly different in terms of the index. In the last step, the weight of each index (Wj) is determined by dividing the weight of each index (dj) by the total (∑dj) values (Azar, 2001).

$$W_j = d_j / \sum d_j$$ Formula 8

4. Research results and findings

The findings of each stage of the research are summarized as follows:

4.1. library study

As fully described in the research method, 70 indicators affecting the ERC were extracted and presented to the panel of experts to run the fuzzy Delphi method by studying articles, dissertations, and research and scientific data (Table 3).

4.2. The first phase of fuzzy Delphi

The fuzzy Delphi approach was used to ask the expert panel's opinion. As fully described in the research method, the de-fuzzy value (Crisp number) greater than 7 is accepted, and an index with a score less than 7 is rejected (Wu and Fang, 2011). The results of the first round of fuzzy Delphi are described in the table below:

Table 3. Fuzzy c-means and fuzzy screening methods are used in the first phase for investigating the indices and to achieve an agreement among experts

Row - indices	Min	Geometric mean	Max	Fuzzy mean	Crisp	Result
1- Cash adequacy ratio	6	8.20	9	(6, 8.2, 9)	7.97	Accepted
2- Leverage ratios	6	7.86	9	(6, 7.86, 9)	7.74	Accepted
3- Development projects	6	7.98	9	(6, 7.98, 9)	7.82	Accepted
4- Unsystematic risk	4	7.73	9	(4, 7.73, 9)	7.32	Accepted
5- The sales growth rate	6	7.65	9	(6, 7.65, 9)	7.60	Accepted
6- Liquidity ratios (current ratio, quick ratio)	2	7.79	9	(2, 7.79, 9)	7.03	Accepted
7- Profitability ratios	6	7.78	9	(6, 7.78, 9)	7.69	Accepted
8- Dividends per share (DPS)	6	7.75	9	(6, 7.75, 9)	7.67	Accepted
9- Net profit	2	7.77	9	(2, 7.77, 9)	7.02	Accepted
10- Profit quality (operating and non-operational)	2	8.23	9	(2, 8.23, 9)	7.32	Accepted
11- Earning management	6	8.01	9	(6, 8.01, 9)	7.84	Accepted
12- Earnings persistence	6	7.78	9	(6, 7.78, 9)	7.69	Accepted
13- Dividend payout schedule	6	7.95	9	(6, 7.95, 9)	7.80	Accepted
14- Growth expectation	5	7.45	9	(5, 7.45, 9)	7.30	Accepted
15- Accrual items	2	7.86	9	(2, 7.86, 9)	7.08	Accepted
16- Information risk	6	8.13	9	(6, 8.13, 9)	7.92	Accepted
17- Financial information transparency	6	8.09	9	(6, 8.09, 9)	7.90	Accepted
18- Financial statement comparability	4	8.06	9	(4, 8.06, 9)	7.54	Accepted
19- Related Party Transactions	3	7.28	9	(3, 7.28, 9)	6.86	Rejected
20- Board of directors' compensation	4	7.19	9	(4, 7.19, 9)	6.96	Rejected
21- Tax evasion	3	7.00	9	(3, 7, 9)	6.66	Rejected
22- Timely financial statements	2	6.61	9	(2, 6.61, 9)	6.24	Rejected
23- Prolonged operating cycle	3	7.14	9	(3, 7.14, 9)	6.76	Rejected
24- International accounting standards	3	7.43	9	(3, 7.43, 9)	6.95	Rejected
25- Capital intensity ratio	6	8.07	9	(6, 8.07, 9)	7.88	Accepted
26- Company lifetime	6	7.55	9	(6, 7.55, 9)	7.53	Accepted
27- Financial system complexity	6	7.65	9	(6, 7.65, 9)	7.60	Accepted
28- Accounting conservatism	2	7.19	9	(2, 7.19, 9)	6.62	Rejected
29- Number of Shares	6	7.65	9	(6, 7.65, 9)	7.60	Accepted
30- Floating Stock	6	7.56	9	(6, 7.56, 9)	7.54	Accepted
31- Market maker	6	7.43	9	(6, 7.43, 9)	7.48	Accepted
32- The weight of the company in the stock exchange index (influential and non-influential companies)	5	7.63	9	(5, 7.63, 9)	7.42	Accepted
33- Daily price fluctuation limit of the company (5%, 3%, 1%)	2	7.78	9	(2, 7.78, 9)	7.02	Accepted
34- Listed in Stock Exchange or Over-the-counter (OTC) Stocks	2	7.61	9	(2, 7.61, 9)	6.90	Rejected
35- Explanatory paragraph of auditor's report	4	7.42	9	(4, 7.42, 9)	7.11	Accepted
36- Type of auditor's report (unqualified, modified, adverse, etc.)	6	7.78	9	(6, 7.78, 9)	7.69	Accepted
37- Auditor's reputation	4	7.31	9	(6, 7.31, 9)	7.04	Accepted
38- Auditor's fee	3	7.26	9	(3, 7.26, 9)	6.84	Rejected
39- Auditor size	1	6.83	9	(1, 6.83, 9)	6.22	Rejected
40- Auditor's expertise related to the industry	2	7.46	9	(2, 7.46, 9)	6.81	Rejected
41- Auditor tenure	3	7.01	9	(3, 7.01, 9)	6.67	Rejected
42- Auditor switching	2	7.71	9	(2, 7.71, 9)	6.97	Rejected
43- Audit effort (Auditor's labor hour)	2	6.93	9	(2, 6.93, 9)	6.46	Rejected
44- Board of Directors' independence	6	7.62	9	(6, 7.62, 9)	7.58	Accepted
45- Managerial ownership	6	7.62	9	(6, 7.62, 9)	7.58	Accepted
46- The number of board members	2	7.55	9	(2, 7.55, 9)	6.87	Rejected

47- The percentage of board non-executive members	2	7.53	9	(2, 7.53, 9)	6.85	Rejected
48- Existence of a risk committee in the company	6	7.65	9	(6, 7.65, 9)	7.60	Accepted
49- State ownership	6	8.51	9	(6, 8.51, 9)	8.17	Accepted
50- Institutional shareholders	2	7.79	9	(2, 7.79, 9)	7.03	Accepted
51- Existence of an audit committee in the company	6	8.05	9	(6, 8.05, 9)	7.87	Accepted
52- Financial expertise of auditing committee members	2	7.59	9	(2, 7.59, 9)	6.89	Rejected
53- Number of auditing committee members	2	7.19	9	(2, 7.19, 9)	6.62	Rejected
54- Competition of capital markets (automobile, real state, gold, currency, etc.)	6	7.75	9	(6, 7.75, 9)	7.67	Accepted
55- Political conditions (domestic and global)	6	7.62	9	(6, 7.62, 9)	7.58	Accepted
56- Social responsibility	2	7.72	9	(2, 7.72, 9)	6.98	Rejected
57- Financial crisis	5	8.40	9	(5, 8.4, 9)	7.93	Accepted
58- Economic conditions (macro-economic factors)	6	7.92	9	(6, 7.92, 9)	7.78	Accepted
59- Capital market regulations	6	8.33	9	(6, 8.33, 9)	8.06	Accepted
60- Direct taxation act	5	7.72	9	(5, 7.72, 9)	7.48	Accepted
61- Monopoly industry	6	7.98	9	(6, 7.98, 9)	7.82	Accepted
62- Technological changes	6	8.27	9	(6, 8.27, 9)	8.01	Accepted
63- Government annual budget	2	7.82	9	(2, 7.82, 9)	7.05	Accepted
64- Inflation rate	6	7.78	9	(6, 7.78, 9)	7.69	Accepted
65- Exchange rate volatility	6	7.72	9	(6, 7.72, 9)	7.65	Accepted
66- Risk-free interest rate	6	7.95	9	(6, 7.95, 9)	7.80	Accepted
67- Systematic risk (Beta)	2	8.00	9	(2, 8, 9)	7.17	Accepted
68- Information asymmetry	6	7.99	9	(6, 7.99, 9)	7.83	Accepted
69- complexity of the production process	6	8.24	9	(6, 8.24, 9)	7.99	Accepted
70- Inflationary expectations	6	8.10	9	(6, 8.1, 9)	7.90	Accepted

It was observed that 19 indices achieved an average value of less than 7, which should be eliminated. The row of these indices is: 19-20-21-22-23-24-28-34-38-39-40-41-42-43-46-47-52-53-56. Hence, 51 indices were accepted in the first phase.

Moreover, 5 new indices capable of influencing the earnings response coefficient were added with the suggestion of the expert panel. These indices include daily trading volume, industry returns, the expertise of boards of directors, duality of the board's activities, and political cycles (elections). A questionnaire consisting of 56 questions was provided and then used for the next phase of fuzzy Delphi.

4.3. Second phase of fuzzy Delphi

Like the first phase, the fuzzy Delphi approach with a 9-point scale is utilized to screen indices and identify ultimate indices (Table 4). Each index with less than 7 should be eliminated.

Table 4. Fuzzy c-means and fuzzy screening methods are used in the second phase

Row - indices	Min	Geometric mean	Max	Fuzzy mean	Crisp	Result
1- Cash adequacy ratio	6	8.13	9	(6, 8.13, 9)	7.92	Accepted
2- Leverage ratios	6	8.16	9	(6, 8.16, 9)	7.94	Accepted
3- Development projects	6	7.99	9	(6, 7.99, 9)	7.83	Accepted
4- Unsystematic risk	6	8.49	9	(6, 8.49, 9)	8.16	Accepted
5- The sales growth rate	6	8.06	9	(6, 8.06, 9)	7.87	Accepted
6- Liquidity ratios (current ratio, quick ratio)	2	7.86	9	(2, 7.86, 9)	7.08	Accepted
7- Profitability ratio	4	7.87	9	(4, 7.87, 9)	7.41	Accepted
8- Dividends per share (DPS)	2	8.00	9	(2, 8, 9)	7.16	Accepted
9- Net profit	4	8.03	9	(4, 8.03, 9)	7.52	Accepted
10-Profit quality (operating and non-operational)	5	7.81	9	(5, 7.81, 9)	7.54	Accepted
11- Earning management	3	6.54	9	(3, 6.54, 9)	6.36	Rejected
12- Dividend payout schedule	2	7.82	9	(2, 7.82, 9)	7.05	Accepted
13- Growth expectation	2	7.92	9	(2, 7.92, 9)	7.12	Accepted
14- Accrual items	4	8.06	9	(4, 8.06, 9)	7.54	Accepted
15- Information risk	2	7.75	9	(2, 7.75, 9)	7.00	Accepted
16- Financial statement comparability	5	7.77	9	(5, 7.77, 9)	7.52	Accepted
17- Earnings persistence	3	7.31	9	(3, 7.31, 9)	6.87	Rejected
18- Capital intensity ratio	5	8.01	9	(5, 8.01, 9)	7.68	Accepted
19- Financial information transparency	2	7.35	9	(2, 7.35, 9)	6.73	Rejected
20- Company lifetime	2	7.39	9	(2, 7.39, 9)	6.76	Rejected
21- Financial system complexity	3	7.31	9	(3, 7.31, 9)	6.88	Rejected
22- Daily trading volume	2	7.78	9	(2, 7.78, 9)	7.02	Accepted
23- The weight of the company in the stock exchange index (influential and non-influential companies)	4	7.96	9	(4, 7.96, 9)	7.47	Accepted
24- Daily price fluctuation limit of the company (5%, 3%, 1%)	2	7.90	9	(2, 7.9, 9)	7.10	Accepted
25- Floating Stock	6	8.13	9	(6, 8.13, 9)	7.92	Accepted
26- Number of Shares	6	8.14	9	(6, 8.14, 9)	7.93	Accepted
27- Industry returns	6	7.93	9	(6, 7.93, 9)	7.79	Accepted
28- Market maker	2	7.57	9	(2, 7.57, 9)	6.88	Rejected
29- Explanatory paragraph of auditor's report	5	8.17	9	(5, 8.17, 9)	7.78	Accepted
30- Type of auditor's report (unqualified, modified, adverse, etc.)	6	7.99	9	(6, 7.99, 9)	7.83	Accepted
31- Auditor's reputation	5	7.79	9	(5, 7.79, 9)	7.53	Accepted
32- Board of directors' independence	6	7.91	9	(6, 7.91, 9)	7.77	Accepted
33- Managerial ownership	5	8.33	9	(5, 8.33, 9)	7.89	Accepted
34- State ownership	2	7.89	9	(2, 7.89, 9)	7.10	Accepted
35- Institutional shareholders	4	7.79	9	(4, 7.79, 9)	7.36	Accepted
36- Existence of an auditing committee in the company	2	7.88	9	(2, 7.88, 9)	7.09	Accepted
37- Existence of a risk committee in the company	3	7.20	9	(3, 7.2, 9)	6.80	Rejected
38- Expertise in boards of directors	6	7.98	9	(6, 7.98, 9)	7.82	Accepted
39- Duality of board's activities	6	7.45	9	(6, 7.45, 9)	7.48	Accepted
40- Competition of capital markets (automobile, real state, gold, currency, etc.)	6	7.55	9	(6, 7.55, 9)	7.53	Accepted
41- Political conditions (domestic and global)	6	7.95	9	(6, 7.95, 9)	7.80	Accepted
42- Financial crisis	2	7.79	9	(2, 7.79, 9)	7.02	Accepted
43- Economic conditions (macro-economic factors)	6	7.95	9	(6, 7.95, 9)	7.80	Accepted
44- Capital market regulations	6	7.88	9	(6, 7.88, 9)	7.76	Accepted
45- Complexity of the production process	3	7.01	9	(3, 7.01, 9)	6.67	Rejected
46- Monopoly industry	6	7.84	9	(6, 7.84, 9)	7.73	Accepted
47- Technological changes	2	7.73	9	(2, 7.73, 9)	6.98	Rejected

48- Government annual budget	6	8.09	9	(6, 8.09, 9)	7.90	Accepted
49- Inflation rate	6	7.85	9	(6, 7.85, 9)	7.73	Accepted
50- Exchange rate volatility	5	7.74	9	(5, 7.74, 9)	7.50	Accepted
51- Risk-free interest rate	5	7.95	9	(5, 7.95, 9)	7.63	Accepted
52- Systematic risk (Beta)	5	8.51	9	(5, 8.51, 9)	8.01	Accepted
53- Information asymmetry	6	8.01	9	(6, 8.01, 9)	7.84	Accepted
54- Direct taxation act	2	7.52	9	(2, 7.52, 9)	6.85	Rejected
55- Political cycles (elections)	5	7.96	9	(5, 7.96, 9)	7.64	Accepted
56- Inflationary expectations	6	8.12	9	(6, 8.12, 9)	7.92	Accepted

It was observed that 10 indices have an average value of less than 7, which should be eliminated. The row of these indices is 11-17-19-20-21-28-37-45-47-54; hence, 46 indices were accepted in the second phase.

Rahmani et al. (2020), in their research concerning "methodological principles and applications of the Delphi method", stated that the Delphi method should be iterated for more than 1 phase (round) and when the expert panel achieves an agreement during two consecutive rounds, the Delphi technique can be stopped. They claimed that there are no suitable criteria to show consensus and convergence. The intending criteria are that 90% of respondents agree that this event will occur with a probability of 90% to 95%. Another criterion that helps achieve consensus and finish the Delphi study is that responses should be constant, and stability should be achieved in the opinions. In this research, the factors mentioned above were observed in the second phase, showing the acceptance and conclusion of the Delphi method in the second phase. If the Delphi method is iterated for more than 2 phases, it can cause exhaustion, and no new and useful result can be achieved.

4.4. Categorization and ranking of ultimate factors capable of influencing the earnings response coefficient in Iran with the aid of Shannon's Entropy

After identifying factors capable of influencing the earnings response coefficient, the mentioned factors are categorized into five applicable groups considering the opinion of the expert panel in the capital market: financial features of the firm and company's financial reporting, company share market, audit quality, corporate governance, and environmental elements. These categories can be used in Iran's capital market, and there is no gap or overlapping associated with the nature of other categories.

The indices were ranked using the Shannon entropy method in the final step. As fully described in the research method, first, the decision matrix is made (Formula 6); after normalizing each index (by dividing the component of each column by the total value of each column), the entropy of each index (Ej) is calculated by Formula 7. Then the degree of deviation of each index (dj) is calculated according to Formula 8; finally, the weight of each index (Wj) is calculated using Formula 9.

The final research Table is achieved after categorizing and calculating the weight of each index. With the aid of each index in each category, the impact of each index on the earnings response coefficient is determined, and the indices are ranked (Table 5).

Table 5. Categorization of factors capable of influencing earnings response coefficient in Iran according to expert panel and ranking of these indices with the aid of Shannon's entropy

Dimensions	Variables	Ej	dj	Wj	Rank
Financial features of the company and financial reporting	Growth expectation	.86700	.13300	.06896	1
	Dividends per share (DPS)	.86801	.13199	.06844	2
	The sales growth rate	.87150	.12850	.06662	3
	Development projects	.87350	.12650	.06559	4
	Profitability ratios	.87595	.12405	.06432	5
	Net profit	.87929	.12071	.06259	6
	Liquidity ratios (current ratio, quick ratio)	.87998	.12002	.06223	7
	Profit quality (operating and non-operational)	.88013	.11987	.06215	8
	Cash adequacy ratio	.88132	.11868	.06153	9
	Leverage ratios	.88138	.11862	.06150	10
	Dividend payout schedule	.88238	.11762	.06099	11
	Financial statement comparability	.88329	.11671	.06051	12
	Unsystematic risk	.88374	.11626	.06028	13
	Information risk	.88384	.11616	.06023	14
	Accrual items	.88460	.11540	.05983	15
	Capital intensity ratio	.89541	.10459	.05423	16
	sum	-	1.92870	1	-
Company's market share	Floating Stock	.87131	.12869	.18131	1
	The weight of the company in the stock exchange index (influential and non-influential companies)	.87401	.12599	.17752	2
	Number of Shares	.87933	.12067	.17001	3
	Daily price fluctuation limit of the company (5%, 3%, 1%)	.87998	.12002	.16911	4
	Industry returns	.89094	.10906	.15367	5
	Daily trading volume	.89468	.10532	.14839	6
	sum	-	.70975	1	-
Audit quality	Explanatory paragraph of auditor's report	.87843	.12157	.35057	1
	Type of auditor's report (unqualified, modified, adverse, etc.)	.88258	.11742	.33861	2
	Auditor's reputation	.89222	.10778	.31082	3
	sum	-	.34676	1	-
Corporate governance	State ownership	.87963	.12037	.15139	1
	Institutional shareholders	.87964	.12036	.15137	2
	Managerial ownership	.87998	.12002	.15095	3
	Existence of an audit committee in the company	.88460	.11540	.14513	4
	Board of directors' independence	.89094	.10906	.13717	5
	Expertise of board members	.89468	.10532	.13245	6
	Duality of board's activities	.89541	.10459	.13155	7
	sum	-	.79512	1	-
Environmental factors	Exchange rate volatility	.87086	.12914	.07851	1
	Political conditions (domestic and global)	.87131	.12869	.07823	2
	Inflation rate	.87386	.12614	.07668	3
	Competition of capital markets (automobile, real state, gold, currency, etc.)	.87397	.12603	.07662	4
	Inflationary expectations	.87417	.12583	.07650	5
	Risk-free interest rate	.87963	.12037	.07318	6
	Systematic risk (Beta)	.87964	.12036	.07317	7
	Financial crisis	.87998	.12002	.07297	8
	Economic conditions (macro-economic factors)	.88460	.11540	.07015	9
	Capital market regulations	.89094	.10906	.06631	10
	Government annual budget	.89292	.10708	.06510	11
	Information asymmetry	.89315	.10685	.06496	12
	Political cycles (elections)	.89468	.10532	.06403	13
	Monopoly industry	.89541	.10459	.06359	14
	sum	-	1.64487	1	-

5. Discussion and Conclusion

This research aimed to identify factors influencing Iran's earnings response coefficient. Ultimately, 46 state-of-art and applicable factors influencing the earnings response coefficient in Iran were extracted with round 2 of the fuzzy Delphi method (Table 3 and Table 4). Next, they were categorized into 5 categories and ranked with the aid of Shannon's Entropy (Table 5).

In response to the following question, "why do some companies with similar earnings or unexpected earnings have higher returns?" studies conducted on the capital market show that not only do prices in the security market respond to accounting information but also, regardless of content and weight of accounting information, there are numerous factors that are causing a change in the investors' investment.

The results of previous studies on the capital market indicate that environmental and surrounding factors, which influence the capital market, have a significant impact on capital market behavior and earnings and/or unexpected earnings are not the only factors capable of influencing investors' behavior. The ranking of factors capable of influencing the earnings response coefficient in this research depicts that the weight of non-financial factors influencing shareholders' response is higher than financial factors (Table 5).

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