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Original Research

The Ability of Elliott Waves Theory to Predict the Information Content of Accounting Profit

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ABSTRACT

This study intends to investigate the ability of Elliott Waves Theory (EWT) to predict the information content of accounting profit before its announcement in companies listed on the Tehran Stock Exchange from 1394 to 1399(Iranian calendar). The present study is applied research in terms of the result's implementation and to collect the data required for the research, the information site of the publishers of Tehran Stock Exchange and Rahavard Novin software and for receiving Elliot Waves signals Advanced GET software has been used. Earnings information content was measured through the test of the relationship between earnings and abnormal returns based on the Portetti model [20]. In order to calculate the abnormal returns, the Zebrowski comprehensive return relationship was used. Finally, the effect of two variables, company size and type of industry, on the ability to predict information content is considered. The results showed that the quarterly profits announced by companies have information content, and EWT can predict profit information content before announcing it. In this regard, company size and industry type do not affect Elliott Waves' ability to predict profit information content.

1 Introduction

The occurrence of an event, such as an earnings announcement, can affect prices. If the information content is not known or new, in other words, it causes price fluctuations. However, due to the information asymmetry theory, the basic premise of which is the complete inefficiency of the market, not all investors are informed of this information simultaneously. Therefore, earnings announcements lead to a price reaction before and after the announcement. Company controllers and informed investors benefit from confidential information before companies declare profits, and the information may also be disclosed and biased by company controllers. Therefore, external investors are looking for alternative methods to examine the behavior of informed investors and holders of confidential information before declaring a profit, Watts & Zimmerman [31]. One of the causes of price changes before the earnings announcement is insider trading based on confidential information. Approaches and theories to dealing

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with confidential information focus on two different perspectives. The most important issue for researchers is the monitoring and prohibition of trades based on confidential information or lack of monitoring of these trades. Two perspectives, each presenting arguments, have led to this difference. The first group believes that trades based on confidential information lead to increased market efficiency, and the second group believes that it leads to a decrease in market efficiency. However, researchers have yet to agree on the same theoretical framework, leading to various empirical research and scientific models. This study examines strategies that can predict the earnings information content before the announcement, thereby increasing the speed of information transfer to the market and its absorption, increasing market efficiency. The Elliott Waves theory was proposed by Ralph Nelson Elliott.[22] This theory examines process behavior through several identifiable and frequent patterns. According to Elliott's theory, investors use Elliott's waves to make low-risk and beneficial trades, creating abnormal returns. Therefore, in this study, considering the mentioned contradictions, Elliott's waves theory has been used as a solution to predict the earnings information content before the announcement. There has been much research on the content of accounting earnings information in Iran. However, less has been performed on predicting earnings information content and methods, tools, and techniques for predicting accounting information content before its announcement. One of the methods for predicting earnings information content and creating abnormal returns has been the use of technical analysis, the sometimes-contradictory results of which were mentioned in the global and Iranian capital markets in the previous section. However, so far, no research has been performed on the ability of Elliott Waves to predict the information content of accounting earnings in the Tehran Stock Exchange. Therefore, the present study intends to address this research gap. The purpose of investing in corporate stocks is to maximize the investor's earnings and welfare. To achieve this goal, appropriate investment decisions must be made. Therefore, investors need the right information to invest to make the most earnings. The results of this study provide a tool for investors to make better and more timely decisions. They will also help increase market efficiency while providing an opportunity to understand some effects of confidential information. Given that the abnormal return on stocks after the announcement of profits for some firms is higher than others, this raises the question of why the market reacts more to the good and bad news of firms than others. Many variables affect the difference in the market response to changes in profits, among which the size of the company is one of the items that has been studied many times in the world literature and is known as a strong and influential factor in the information content of financial reports, especially earnings. To answer the question of whether the market reaction to the announcement of profits differs among companies of different sizes? Therefore, more attention should be paid to information disclosure in small and medium companies because it is essential for investors. Company size is often used as a metric to measure the number of other information resources. Evidence from research shows that the reported profits of smaller companies have more informative content due to the limited other sources of information of these companies. The type of industry can also affect the information content of profits. Financial reports of firms in an industry are considered important sources of information for financial analysts. Research has shown that firms' stock prices react to the announcement of profits of other firms in the same industry, and information about the profits of companies announced earlier than other companies in an industry can affect the information content of profits of other firms in the same industry. There is more news and information about one industry than another[39] .Stakeholders who cannot access companies' essential and confidential information promptly, as well as capital market analysts and short-term investors and speculators, investment fund advisors, and stock market traders, will be the beneficiaries of this

research. Given the large number of investors, creditors, and economic actors and the growing public attention to the capital market, they are undoubtedly looking for more returns than other markets.

2 Theoretical Fundamentals and Research Background

In the 1970s, three eminent scientists in the field of information economics, Michael Spence, George Akerlof, and Joseph Stiglitz, made a groundbreaking contribution to the field with their theory of information asymmetry. Their work was so profound that they were awarded the prestigious Nobel Prize in Economics in 2001, a testament to the significance of their research in the analysis of asymmetric information markets, Ghaemi and Watanparast [24]. Akerlof's seminal 1970 paper, "The Market for Lemons," was a pivotal study in the information economy literature, drawing the attention of experts in various economic fields to the issue of information asymmetry and its far-reaching consequences. His idea, though simple, is profound and pervasive, with numerous impacts and wide applications. In this article, Akerlof introduces the first formal analysis of markets facing the problem of mis-selected information. He introduced a type of commodity market in which the seller has more information than the buyer. With the help of the scientific hypothesis, Akerlof showed that the information issue may cause the whole market to stop or, in a contractionary way, lead the market to the wrong choice of low-quality products. The root of the theory is based on the principle that in a transaction, if one of the parties is not aware of the real condition of the commodities in question, the other party can make more earnings. In such circumstances, a kind of lack of confidence and uncertainty will prevail in the trading environment, which will eventually lead to a weakening of market flow or, in other words, market failure, Levin, [32]. In the book "Financial Accounting Theory," William Scott [30] defines information asymmetry as the information advantage of some parties to a transaction over others in a business transaction. Approaches and theories to insider trading are focused on two different perspectives. The most important issue for researchers is the monitoring and prohibition of trading based on confidential information or non-monitoring of this type of trade. In fact, two different perspectives, each of which presents arguments, have led to this difference. The first group believes that inside trading leads to increased market efficiency, and the second group believes that it leads to a decrease in market efficiency. However, researchers have not yet agreed on the same theoretical framework, and this has led to a wide variety of empirical research and scientific models. The efficient market hypothesis basically claims that if the capital market is relatively efficient, it will act quickly and vigorously in the process of absorbing information, and stock prices in the market will always be a good reflection of events related to the company. According to this hypothesis, no one can systematically gain more in the long run than the amount of risk he has accepted. One of the characteristics of an efficient market is that the stock price at any given time reflects the intrinsic value of the stock according to the information available and relevant in the market, and there is no abnormal return in this market. Therefore, if this abnormal return on the market can be reduced, the market efficiency will increase. The present study is based on the opinion of some experts, who believe that transactions based on confidential information (Insider trading) do not increase market efficiency. The Elliott waves theory, a truly innovative approach, was proposed by Ralph Nelson Elliott. This theory examines process behavior in the form of several distinct identifiable and reproducible patterns. According to the Theory of Mr. Elliott, waves are of two kinds. impulsive waves (in the same direction as the trend) and corrective waves (in the opposite direction of the trend). Impulsive waves have a quintuple structure, and corrective waves have a triple structure. This means that the market movement is always composed of five interconnected waves in the same direction as the trend, which we number from 1 to 5, and three interconnected waves in the opposite direction of the trend, which are named from a to c.

Seif, Samira et al . [25], in a study entitled "Predicting Stock Market Trends of Iran Using Elliott Wave Oscillation and Relative Strength Index", seeks to determine the future trend of the Iranian stock market

through Elliott wave oscillators and machine learning algorithms supervised and classified.Total index data from 2008-05-14 to 2020-11-25 were reviewed daily. Elliott wave patterns were identified using the Elliott wave oscillator and relative motion strength index and labeled into three categories: LONG, SHORT, and HOLD. Machine learning algorithms include Decision trees, Naive Bayes, and Support vector machine to repeat these learning patterns, then tested on test data.The results showed that identifiable Elliott waves, Support vector machine, and Decision tree algorithms in the Tehran Stock Exchange index can predict the future trend of the total index with an accuracy of over 90 percent. In the Iranian capital market, the chart of the Elliott Behavior Index is observed, and all active persons on the Tehran Stock Exchange can use the proposed method for their trading system. Duan, Huiming, et al. [10] investigated the Elliott wave theory and the Fibonacci sequence-gray model and their application in the Chinese stock market, and they expressed that the Elliott Wave Theory has the advantages of universality and accuracy. It accurately depicts how the stock market works and has become an important tool in securities market modeling. Elliott Wave Theory includes five rising and three descending waves, with important quantitative features related to the Fibonacci series and the golden ratio. At the same time, China's Shanghai Composite Index reflects the systemic risk of the stock market to a certain extent. If China's Shanghai Composite Index could be accurately predicted, they could take the necessary precautions to prevent risk in the system.

Therefore, they use gray model features, which are highly adaptable and can handle parameter changes. The results show that the new model can choose an optimal model according to the data characteristics and is more effective. The new model can also provide new information for forecasting stock price indexes and provide help and reference for stock price index forecasts. Güngör Gündüz [14], in a study entitled "Physical approach to elucidate stability and instability issues, and Elliott waves in financial systems: S & P-500 index as a case study," expressed that The dynamics of financial systems depend not only on Brownian motion but also on wave-like behavior of fluctuations. Statistical mechanics and viscoelastic theory were used to elucidate it by using the daily data of S&P-500 from 1986 to 2019. The viscoelastic behavior of asset values or stock market index can be studied based on the "cause-and-effect" principle using a scattering diagram of the data. The angles between the consecutive vectors in the scattering diagram reveal that some peculiar angles deviate from the main course of the percent occurrence. These angles correspond to relatively more stable states and can be expressed in terms of the golden ratio. These peculiar angles can explain the Elliott waves and golden ratio observed in financial systems. These angles reveal more frequently whenever stability is of major concern, such as in sharp falls or increases and in Elliott waves. The formation principles of Elliott waves were established on physical and mathematical grounds. Vaghela, Vaidehi, et al. [36], in a study entitled "Elliott Wave Formation using Hybrid Strategy of Stochastic and ADX Indicators," expressed that in the finance market, there are two types of Analysis, namely fundamental Analysis and Technical Analysis. In this paper, we work on both fundamental and technical Analysis. Fundamental factors are price-to-earnings ratio, free-float market capitalization, and technical tools like Stochastic Oscillators and Average Directional Index (ADX). We use these technical tools to determine buy and sell signals in an up-and-down trend. Using the fundamental factors for stock selection and applying the trading strategy, which gives a better signal, they try to explain wave formation using this hybrid strategy and examine its performance on NSE data. Pakbaz et al. [19] investigated the predictive ability of earnings announcement information content by Technical Analysis signals. The results indicate that the trading criteria selected in the technical Analysis can generate adjusted returns based on transaction costs and positive abnormal returns to predict information content. Therefore, the technical analysis strategy in

the information capital market can predict companies' earnings announcements. Salehi et al. [26] examined the information content of the declared and projected earnings per share to explain the abnormal stock returns. The results of regression analysis and correlation tests confirm a significant direct relationship between the variables of earnings per share and earnings per share prediction with abnormal returns compared to the predicted earnings per share. Arab Mazar Yazdi and Jamalianpour [5] compared the information content and usefulness of intermediate profit and loss statements in the Tehran Stock Exchange of 3-, 6- and 9-month periods. The results showed that the information content of these statements is at the highest level for future cash flow forecasting and at the lowest level for forecasting stock return. Dastgir and Akhgar [2] examined the information content of the components of the profit and loss statement and the cash flow statement. The results showed that among the components of the profit and loss statement, net profit and loss, and the cash flow statement components, cash flow from operating activities is more related to stock returns. Also, the results show that the components of the profit and loss statement are generally more related to stock returns than the components of the cash flow statement. Kamravafar and Hashemi [16] studied and identified the main variables affecting Iran's total capital market index and its modeling using artificial neural networks and compared the results with Technical Analysis and Elliott waves. In this regard, the GMDH network showed that among the variables used as macroeconomic indicators, the unemployment rate variable is redundant, and its impact is negligible. However, other variables (exchange rate, inflation, output growth, liquidity volume) had a double effect. Also, another finding of the study, while confirming similar results for neural networks and technical Analysis, indicates the higher power of neural networks in predicting the capital market index. Virtanen [28] investigated the effect of economic policy uncertainty on the information content of profit declarations. Economic policy uncertainty has been shown to reduce trading volume during the profit declaration window. In addition, this effect increases during the day of the profit declaration announcement and the day after. This shows that the information shock caused by the earnings announcement decreases during the uncertainty of high economic policies, and this means a reduction in the information content of earnings declarations. The results of changes in this phenomenon over time are contradictory, and no clear conclusion can be drawn. In a study entitled "Increased Market Response to Earnings Announcements in the 21st Century: An Empirical Investigation, "Beaver et al. [6] examined the role of concurrent information in significantly increasing investors' response to profit declarations. The results showed that management guidance, analysts' forecasts, and disaggregated items in the financial statements are more likely to be accompanied by earnings statements, and each of these explains part of the increase in market response. In addition, this concurrent discloser explains a significant portion of the increasing market response to profit declarations since 2001. In a study entitled "The Ability of Accounting Information in Explaining Stock Returns," Zhang et al. [31] showed that revenue-related news explains more price movements over time. In the years after 2003, the return on revenue statement explains approximately 20% of the annual return, which is twice as high as before. This shows that basic information has become more important in explaining stock returns in recent years. This pattern exists for other forms of company core information. In a study entitled "Institutional Ownership, Business Cycles and Earnings Informativeness of Income Smoothing: Evidence from Iran," was investigated that Managers engage in income smoothing either to communicate private information about future earnings to investors (informativeness hypothesis) or to distort financial performance for opportunistic purposes (opportunism hypothesis). Business cycles and the monitoring role of institutional ownership may affect the earnings informativeness of income smoothing. This research examines the effect of business cycles and institutional ownership on earnings and the informativeness of income smoothing. One hundred forty firms listed on the Tehran Stock Exchange are selected as the sample from 2010-2016. The results

showed that, during the recession, income smoothing does not effectively communicate information about future earnings, and thus, earnings are less informative. Moreover, higher levels of institutional ownership are associated with a decrease in their monitoring role and a decrease in the earnings informativeness of income smoothing. Finally, the results suggested that business cycles do not significantly affect the relationship between institutional ownership and the earnings informativeness of income smoothing.[13] Beaver et al. [7] studied the information content of quarterly earnings statements in a study entitled "The information content of earnings announcements: New insights from intertemporal and cross-sectional behavior," and four main findings were substantiated. First, there has been a significant increase in information content in revenue history since 2001. Second, the market response to loss-making companies is less than that of profitable companies. Third, there is a significant backlash against larger companies. Fourth, the reaction in revenue history increases significantly in analyst coverage, and when analyst coverage is controlled, the correlation with the size is less significant. In a study entitled "Evaluating the Information Content of Earnings Forecasts", Ashton and Trinh [35] provide a framework for comparing the ability of alternative approaches to earnings forecasting to capture market expectations of future revenue. The results showed that the investment strategy of buying and holding these stocks generates significant abnormal returns. This study explains why these and similar strategies are successful. In a study, the relative content and return additive with cash recovery have been addressed in the corporates of the Tehran Stock Exchange. This research population includes the corporates accepted by the Tehran Stock Exchange over five years (2010-2014). Finally, considering the research limitations and using the systematic deletion method, the information related to 109 corporates has been gathered. Concerning the defined goals, this research is regarded as an applied one. The research design is an event because of background data, and its deduction method is induction and correlation. The current study involves a primary and six secondary hypotheses; here, a linear regression method has been used to examine the hypotheses. [18] In a study entitled "The Effect of conservative reporting on the investor'sInvestor's Opinion Divergence at the Time of Earnings Announcement by Mokhtari K.& Gholami J. R. in 5 years during 2012-2016, the required data have been collected from Tehran Securities and Stock Exchange Organization, and the population consists of 585 corporates-years which the systematic removal sampling has selected. Linear regression and correlation were used to investigate the research hypotheses, and to analyze data and test the hypotheses, Eviews software was utilized. In conclusion, it can be pointed out that the conservative measures are negatively related to the proxies of investors' opinion divergence at the time of earnings announcement, and the relationship is stronger when the corporation reports bad news; also, conservation information content is stronger when the market is shocked by an announcement.[18] Angelo and Grimaldi [12] examined technical Analysis's ability to predict financial markets. The results show that in the 2009-2015 period, the US dollar/euro exchange rate is very accurately predicted. A potential future pattern is also set for the launch of the exchange rate in March 2017. This study confirms the usefulness of the Elliott waves theory for predicting foreign exchange markets. Kotyrba et al. [29] detected Elliott waves based on neural networks in a study. The goal was to find and recognize the major Elliott patterns that occur repeatedly in market history to predict prices. This study confirms that detecting Elliott waves makes it possible to predict the following time series trends. If we know the impulsive phase of an Elliott wave, the prediction is downward. The prediction is upward if we recognize the correction stage of an Elliott wave or triangle pattern. In a study, Vaghela, Vaidehi, et al. [37] expressed that fundamental Analysis combines economic, industry, and company analysis to obtain a stock's fair value, called underlying value. Technical Analysis is the observation of trading opportunities based on market activity. This work uses two fundamental parameters, Earnings Per Share and Price-to-Earnings Ratio,

to identify profitable stock. The Commodity Channel Index (CCI) and Double Exponential Moving Average (DEMA) are used to examine the buying and selling opportunities and to identify the trend strength. they tried to develop Elliott wave formation through the Commodity Channel Index and introduce the concept of combining the two strategies using a live example from the NSE.The results of another research show that there a reverse (negative) relationship between institutional ownership level, managerial ownership level, and ownership concentration level with liquidity. Also, there is a direct (positive) relationship between corporative ownership level and liquidity [40].Based on other research indicates that there is a positive and significant relationship between institutional investors and passive institutional investors with conservatism. Other findings suggest that cost stickiness has a positive impact on the relationship between institutional investors and passive institutional investors with conservatism[41]. Javaheri and zanjirdar showed that there was a significant relationship between the profit management and companies performance. The profit management is also effective in forecasting future cash fund, in forcing solidarity between running and future yield[42].

3 Methodology

The present study is applied research in terms of the result of implementation. In terms of data collection, it is a quantitative type. The information site of the Tehran Stock Exchange publishers and the Rahavard Novin software have been used to collect the data required for the research. The statistical population of the present study includes companies present on the Tehran Stock Exchange at the end of March 2017, which was equal to 458 companies. As a result of applying the conditions in systematic selective sampling, 88 companies were selected from the statistical population to perform the tests.

3.1 Research Hypotheses

Hypothesis 1**:** Earnings announcements on the Tehran Stock Exchange have information content.
Hypothesis 2**:** Elliott Waves Theory signals can predict earnings information content before it is announced.
Hypothesis 3**:** The size of the company affects the ability to predict the earnings information content before the announcement by Elliott Waves Theory signals.
Hypothesis 4**:** The type of industry affects the ability to predict the earnings information content before the announcement by Elliott Wave theory signals.

3.2 Materials and Methods

The dependent variable of research, abnormal company return $AR_{i.t}$ is calculated from the difference between actual firm returns and market returns according to Equation (1).The above variable needs to be estimated based on the estimates obtained from the buy and sell signals of the Elliott waves theory method, which is indicated by $ELAR_{i,t}$

$$ELAR_{i,t} = R_{i,t} - R_{m,t} \quad (1)$$

$ELR_{i,t}$: The normal return of the i-th share at time t due to the Elliott Theory signals

$R_{m,t}$: Market return at time t

Considering the (1) equation, abnormal returns due to Elliott theory signals $ELAR_{i,t}$, at first the normal returns of stock i due to Elliott theory signals $ELR_{i,t}$ in the financial period t is calculated by means of the buy and sell signals by the labeling of the wave number automatically by the artificial intelligence embedded in the Advanced GET software and based on the buy and sell signal of each period t, the comprehensive return formula is used:

$$ELR_{i,t} = \frac{ELP_t(1+\alpha+\beta)-(ELP_{t-1}+C\alpha)+D_t}{ELP_{t-1}+C\alpha} \quad (2)$$

In which

ELP_t: The stock price at the end of period t is taken as the wave start/end signal by automatic software wave counting.

ELP_{t-1}: The stock price at the beginning of period t is taken as the wave start/end signal by automatic software wave counting.

D_t : Cash profit paid in year t
α: Percentage increase in capital from receivables and cash inflows
β : Percentage of capital increase from the investment
C: Nominal amount paid by the investor for a capital increase from cash and receivables
R_{mt}: market rate of return. To calculate the market return, the return on the cash return index and the price of the Tehran Stock Exchange (TEDPIX) have been used as follows:

$$R_{mt} = \frac{TEDPIX2_t-TEDPIX1_t}{TEDPIX1_t} \quad (3)$$

$\Delta NI_{i,t}$: Changes in the net profit of Company i in the financial year t

In this study, the prices at the beginning of the period ELP_{t-1} and the end of the period ELP_t, based on the Elliott theory signals from automatic wave counting by artificial intelligence embedded in Advanced GET software, are equal to the closing price of the start and end days of the wave.

Siz_i : Company size
In this research, the natural logarithm of the company market value is used as the size of the company, which is presented in the following equation:

$$Siz_i = LN(MV_i) \quad (4)$$

Ind_j: Industry Type
Industry type means that the company belongs to the j[th] industry listed in the Iranian capital market
The research variables are presented in Table 1:

Table 1: Research variables

Row	Type	Variable name	Variable symbol	Operational Definition
1	Dependent	abnormal return due to Elliott signals	$ELAR_{i.t}$	$ELR_{i.t} - R_{mt}$
2	Dependent	Normal share returns due to Elliott signals	$ELR_{i.t}$	$\frac{ELP_t(1+\alpha+\beta)-(ELP_{t-1}+C\alpha)+D_t}{ELP_{t-1}+C\alpha}$
3	Modifier	Company size	Siz_i	$LN(MV_i)$
4	Modifier	Type of industry	Ind_j	Assignment of share to industry j of Iranian capital market
5	Independent	Market returns	Rm	$\frac{TEDPIX2-TEDPIX1}{TEDPIX1}$
6	Independent	Profit changes	$\Delta NI_{i.t}$	$NI_{i.t} - NI_{i.t-1}$
7	Independent	Stock prices at the beginning of period t in Elliott	ELP_{t-1}	Elliott waves initial signal from the artificial intelligence of Advanced Get software
8	Independent	Stock prices at the end of period t in Elliott	ELP_t	Elliott waves second signal from the artificial intelligence of Advanced Get software
9	Independent	Closing price of the 1st stock in the t-1 period	$Pc_{i,t-1}$	

The first Hypothesis from the event test and Cumulative Abnormal Return (CAR) test are used to measure the information content of quarterly earnings statements. This model assumes that market return (Rm) is the result of the expected process of companies' stock returns in each time period. Therefore, the difference between the actual return of Company i in period t and the market return in the same period indicates the abnormal return of shares of Company i in period t. In the present study, inspired by the methodologies of Drobetz, W., Kammermann, M. & Wälchli, U., [12] the modified return of i share in the t[th] month is calculated as follows:

$$AR_{i,t} = R_{i,t} - R_{m,t} \quad (5)$$

$\boldsymbol{R_{i,t}}$ Stock return of company i in month t

$\boldsymbol{R_{m,t}}$ Return of price index and cash return of Tehran Stock Exchange in month t

$\boldsymbol{AR_{i,t}}$ Abnormal Return (Adjusted for Return) of Stock i in month t

After calculating the abnormal monthly return, the following equation is used to calculate the average abnormal return of n sample shares in month t:

$$AR_T = \frac{1}{N}\sum_{i=1}^{N} AR_{i,t} \quad (6)$$

AR_T Average abnormal rate of return of n shares in month t

N Number of shares per month t

After calculating the average abnormal rate of return for n shares in month t, the following equation is used to calculate the cumulative abnormal rate of return.

$$CAR_{Q\_S} = \sum_{T=Q}^{S} AR_T \quad (7)$$

CAR_{Q_S} (Stacked) Stocks during q[th] to s[th] days

It should be noted that in this study, a period of 40 days from 30 days before the earnings announcement to 10 days after has been used to calculate the abnormal return due to the earnings announcement. In this research, the market return has been used based on the price index and cash return of Tehran Stock Exchange, which the Rahavard Novin software has calculated. In this study, t-test was used to investigate the existence of significant abnormal returns around the companies' profit announcement. Therefore, the hypotheses tested were formulated as follows:

$H_0: \text{CAR} = 0$

$H_1: \text{CAR} \neq 0$

In the second hypothesis, the test of relevance of information content of earnings Could be measured by different models by researchers, five of which are mentioned below:

First Model: One of which model is introduced by Portetti et al., following Bal and Brown [20] as described in Equation (8):

$$AR_{i,t} = \alpha_0 + \beta_1 \Delta NI_{i,t} + \varepsilon_{it} \quad (8)$$

$AR_{i,t}$: Company's abnormal stock returns which is the dependent variable of this research

α_0: Fixed component

β_1: Regression coefficient

ε: Error component

$\Delta NI_{i,t}$: Periodic changes in the i[th] Company's net earnings in financial period t

(ERC) Earnings response coefficient (t-Statistic coefficient variable $\Delta NI_{i,t}$) is used to measure the information content of accounting earnings. It becomes clear that earnings response coefficients, as the

coefficients of the linear Equation of changes in earnings per share with stock returns, are a reliable measure of the information content of accounting earnings. The significance of the regression model of Equation (2-1) is evident in its ability to indicate this information content. When earnings change simultaneously with stock returns, it signifies a high information content. In other words, a change in stock returns is a reaction to changes in earnings over a period of time. This relationship between return and earnings, which the earnings response coefficient measures, confirms that accounting earnings indeed include valuable information content.

Second Model: Another model of measuring the information content of earnings based on the model of Stone and Harris (1991) is a function of earnings per share and its changes. It is calculated as follows, and it is assumed that both the amount of earnings and its changes help Explain stock prices.

$$AR_{j,t} = \beta_0 + \beta_1 E_{j,t} + \beta_2 \Delta E_{j,t} + \varepsilon_{j,t} \quad (9)$$

$AR_{j,t}$:Abnormal returns in the j[th] Company in financial period t

$E_{j,t}$: Net earnings in the j[th] Company in financial period t

$\Delta E_{j,t}$: Differences between changes in net earnings in the j[th] Company in financial period t and t-1

Therefore, both the amount of profit and its changes are used as indicators to measure the information content of profit.

Third Model: According to Jung and Ken's view, earnings information content can be measured using regression and stock returns, the model of which is as follows:

$$RETT_{i,t} = \alpha + \beta \frac{E_{i,t}}{P_{i,t-1}} + \varepsilon_{i,t} \quad (10)$$

$RETT_{i,t}$: The return on the total financial period t in the share of i

$E_{i,t}$:Earnings per share i in the financial period t

$P_{i,t-1}$ The price of share i in period $t-1$

Forth Model: A standard model for measuring the relevance of profits has been used as a reference model for measuring relevance in Jones et al. (2011), Francis and Skipper (1999), Collins et al. (1997), and Bushman et al. (2003). The profits used are as follows:

$$RET_{i,t} = \alpha + \delta_1 * \frac{Earn_{i,t}}{Assets_{i,t-1}} + \delta_2 * \frac{\Delta Earn_{i,t}}{Assets_{i,t-1}} + v_{i,t} \quad (11)$$

$RET_{i,t}$: Return on shares i in the financial period t

$Earn_{i,t}/Assets_{i,t-1}$: Nominal profit for the current year t divided by the total assets of the previous year Company i

$Earn_{i,t}/Assets_{i,t-1}$The difference between the nominal profit of the current year t and the nominal profit of the previous year divided by the total assets of the previous year Company i

Fifth Model: One method of testing the relevance of information content is the use of Wald statistics. This test is based on a statistical test originally created by Wald. The best model is selected by comparing the values of the coefficient of determination R^2.

Our research, guided by the purpose of understanding and measuring the content of accounting profit information, has found its compass in the Portetti et al. [20] model. This model, widely referenced by researchers, serves as a beacon, illuminating our path and guiding our findings.In the third hypothesis,

in order to investigate the effect of firm size on the ability to predict profit information content before announcement by Elliott Waves Theory signals, the following formulated model is used:

$$ELAR_{i,t} = \alpha_0 + \beta_1 \Delta NI_{i,t} + \beta_2 \Delta NI_{i,t}.size_{i,t} + \varepsilon_{i,t} \quad (12)$$

$H_0: \beta_2 = 0$

$H_1: \beta_2 \neq 0$

$ELAR_{i,t}$ i[th] abnormal return in the financial period t

$\Delta NI_{i,t}$ Percentage change in net earning of i[th] company in financial period t

$siz_{i,t}$ Company size equal to the logarithm of the current value of the i[th] company

They are classified into two categories for analysis: large and small companies. In order to classify companies, the average natural logarithm of companies' market value is used as a basis for separation. One of the applications of information content is to test the relevance of information in two different groups and compare them (for example, small and large companies). First, companies are divided into small and large categories; then, the hypothesis is tested through the significance test. The two groups are then compared. The Kramer test should be utilized to determine the significant difference between the two groups. In the fourth hypothesis, to investigate the effect of industry type on the predictive ability of profit information content before the announcement by Elliott theory signals for different industries, as in the third hypothesis, significant tests are performed separately, groups are compared, and the Kramer test is performed.

$$ELAR_{i,t} = \alpha_0 + \beta_1 \Delta NI_{i,t} + \beta_2 \Delta NI_{i,t}.Ind_{i,t} + \varepsilon_{i,t} \quad (13)$$

$H_0: \beta_2 = 0$

$H_1: \beta_2 \neq 0$

$ELAR_{i,t}$ i[th] abnormal return in the financial period t

$\Delta NI_{i,t}$ Percentage change in net earning of i[th] company in financial period t

$Ind_{i,t}$ Type of industry in i[th] company

4 Findings

The results of the descriptive analysis of the data showed that out of the total number of 1780 company-seasons in 1486 company-seasons, either the publisher did not publish the interim financial report or the signal software needed to be provided. Therefore, 214 company-seasons were analyzed as final data. Based on the results of descriptive analysis, 111 small companies and 103 large companies were studied in this research. The average earnings change in small companies is -20.79%, and in large companies, it equals 24.33%.

Also, the average abnormal return in small companies is 2.86%, which is 1.9% in large companies. The Shapiro-Wilk test is used to check the normality of the observations. According to the following results, as expected, the hypothesis of the normality of the observations is rejected since the research data type is the data panel.

Table 2: Summary of Shapiro-wilk test results

index / Variable	Observations	Statistic	P-Value
Abnormal return	214	8.791	0.000
change in profit	214	8.118	0.000

Durability tests such as unit root are performed. In examining the existence of a unit root, the null hypothesis implies the existence of a unit root in the variable under study. However, the opposite hypothesis indicates the absence of a unit root and variable durability.

Table 3: Results of the Study of The Existence of a Unit Root

Variable	ADF - Fisher
Abnormal return	-11.488(0.000)
change in profit	-9.638 (0.000)

In the above table, the generalized Dickey-Fuller unit root test is used, which shows the rejection of the null hypothesis and the durability of the variables. In model selection for composite data, two general cumulative and panel models can be detected by the F-Limer test. The appropriate model for estimating the studied models has fixed or random effects and is not pooled. Considering that the panel method is approved based on the F-Limer test results, the Hausman test is used to determine which panel method (fixed effects or random effects) is more suitable for estimation.

A model with random effects is accepted. As a result, the panel model with random effects is selected.To test the power of Elliott Waves Theory signals for predicting earnings information content before it is announced, the abnormal return is calculated for a total of 214 companies-seasons, and then the relationship between declared earnings and abnormal returns is examined based on the amount of earnings change in the same season. This is based on the tests formulated and mentioned in the third chapter. Based on the Mean Absolute Percentage Error (MAPE), the error is 5.24%, and this method has an acceptable accuracy of 94.76%.

The model selection process was conducted using the Portetti et al. [20] model for the relevance test. The data, meticulously generated by the Elliott signal data panel model with random effects, were then detected, and the results of model fit are presented in Tables 4,5 and 6:

According to Table 4, the model's coefficient of determination is equal to 0.478, which means that 47.8% of the changes in the abnormal return variable are explained using this model and based on the percentage change in the profit change.

Table 4: Model summary

model	**R**	R^2	$\overline{R^2}$
1	.691[a]	.478	.475

Table 5: Results of analysis of variance

Model		**sum of squares**	**Degrees of freedom**	**Mean Square**	**F**	**P-Value**
1	Reg.	21243.811	1	21243.811	193.991	.000[b]
	Residual Error	23216.008	212	109.509		
	Total	44459.819	213			

According to Table 5, the significance level for the earnings percentage change variable is equal to 0.000, so its presence in the model is significant. The significance level for the fixed value or y-intercept is more than 0.05, so its presence in the model is not significant.

Table 6: Regression model coefficients

Model		Non-standard coefficients		standard coefficients	t	Sig. level
		B	standard error	Beta		
1	(Constant)	-.682	.715		-.954	.341
	change in profit	.119	.009	.691	13.928	.000
Wald Statistic						32.53 (0.000)
Wardridge autocorrelation test statistics						50.853(0.001)
Statistic justified Wald						1.1 e+ 36(0.000)

According to Table 6's results, the earnings percentage change has a statistic of 13.928, a coefficient of 0.119, and a significant level of less than 5% (0.000). Hence, the null hypothesis means no correlation exists between the two rejected variables. The earnings percentage change variable directly and significantly correlates with the abnormal return, and the first hypothesis is confirmed.The Wald statistic value of 32.53 and the p-value of (0.000) for the general model underscore its significance in the general case.

The results of the modified Wald tests and Wooldridge autocorrelation, which initially indicated variance heterogeneity and the presence of autocorrelation, have been effectively resolved through parameter estimation using the GLS method. In order to measure the information content of earnings announcements in the Tehran Stock Exchange, as presented in the research methodology section, based on an event study, we test the hypothesis that whether the average of the "cumulative abnormal return" variable is equal to zero or not. A one-sample t-test should be used to test this hypothesis. Since the normality of the population distribution is the presumption of this test, we first examine the normality of the data distribution for this variable. According to Table 7, the significance level for the normality test is 0.000, which is significant at $p < 0.05$, so the null hypothesis is rejected, and we conclude that the cumulative abnormal return variable does not have a normal distribution.

Table7: Kolmogorov-Smirnov normality test

Results	cumulative abnormal return
number	214
statistics	.176
Sig. level	.000[c]

4.1 Chi-Square Test Results

The chi-square test was used to test the hypotheses. In order to perform the chi-square test, we classified the cumulative abnormal return variable data into three categories, and then the chi-square test was performed. According to the results of Table 8, the number of data equal to zero is 3 cases, less than zero 7 cases, and greater than zero 284 cases. According to the Chi-square test results, the significance level of this test is equal to 0.000, which is significant at the level of $p < 0.05$. Therefore, the assumption that the cumulative abnormal return variable is zero is rejected, which confirms that the declared quarterly earnings have informational content.

Table 8: Frequencies

Result	Abnormal Classified Returns
Chi-square statistics	529.612
Degrees of freedom	2
Sig. level	.000

Testing Hypothesis 3: Company size affects the ability to predict earnings information content prior to announcement by Elliott Waves Theory signals.

To test this hypothesis, we add the firm size variable as a control variable to the data panel model with random effects presented in the previous section and review the results again. The results are summarized in Table 9:

Table 9: Results from model fitting

Variable	coefficient	Standard div.	Z Statistic	P-Value
Change profit	0.405	0.007	5.54	0.000
Size	0.119	0.025	0.47	0.640
Constant	-0.002	0.017	-0.14	0.890
Wald Statistic				32.66(0.000)
Wardridge autocorrelation test statistics				50.853(0.001)
Statistic justified Wald				1.1 e+36(0.000)

According to the presented results, it is observed that the size variable has a statistic of 0.47, a coefficient of 0.119, and a significance level of more than 5% (0.640). Therefore, there is no reason to reject the null hypothesis, stating that there is no relationship between the two variables, and it can be said that the firm size variable does not affect abnormal returns. The Wald statistic value and the probability value for the general model are 32.66 and (0.000), respectively, which indicates the significance of the model in the general case (because the probability value of this statistic is less than 0.05). The results of modified Wald tests and Ridge autocorrelation, which are used to investigate the variance heterogeneity and the existence of autocorrelation, respectively, indicate the variance heterogeneity and the existence of autocorrelation, which has been solved by estimating the parameters by the GLS method.The results of the above study can also be examined using the Kramer test. The results of the relationship between the size variable and abnormal return are summarized in Table 10. That is, the lack of correlation between the two variables is accepted, and this confirmation is also significant for the results of the above model and the lack of significant correlation.

Table 10: Kramer test

test	Statistic	P-Value	result
Kramer	1.000	0.473	In significant

To test forth hypothesis Similar to the previous hypothesis, we add the industry type variable as a moderator variable to the data panel model with random effects presented in the first hypothesis and review the results again. The results are summarized in Table 11:

According to the presented results, it is observed that the type variable has a statistic of -1.28, a coefficient of -0.002, and a significance level of more than 5% (0.201). Therefore, there is no reason to reject the null hypothesis, stating that there is no relationship between the two variables, and it can be said that the industry-type variable is unrelated to the abnormal return. The Wald statistic value of 34.23 and the p-value of (0.000) for the general model underscore its significance in the general case. The

results of the modified Wald tests and Wooldridge autocorrelation, which initially indicated variance heterogeneity and the presence of autocorrelation, have been effectively resolved through parameter estimation using the GLS method.

Table 11: Results from model fitting

Variable	coefficient	Standard div.	Z Statistic	P-Value
Change profit	0.414	0.007	5.75	0.000
Ind.	-0.002	0.002	-1.28	0.201
Constant	0.032	0.026	1.25	0.212
Wald Statistic				34.23 (0.000)
Wardridge autocorrelation test statistics				50.878(0/000)
Statistic justified Wald				1.1e+36(0.000)

The results of the above study can also be examined using the Kramer test. The results of the relationship between the industry-type variable and abnormal return are summarized in Table 12. Since the test statistic is equal to 1, the p-value is equal to 0.418, greater than the significance level $\alpha = 0.05$. The null hypothesis of the Kramer test states that the lack of correlation between the two variables is accepted, which also confirms the results of the above model and the lack of significant correlation.

Table12: Kramer test

test	Statistic	P-Value	result
Kramer	1.000	0.418	In significant

5 Discussion and Conclusions

This study aimed to investigate the ability of Elliott Wave Theory to predict the information content of accounting profit before announcing it. Elliott Wave Theory has become the most potent method of technical analysis to describe the stock market after years of experimentation. Wave theory has global advantages and predicts the index trend, and its price is interestingly accurate. Therefore, wave theory explains the stock market and predicts future market trends. The use of technical analysis has a long history. Some believe that the oldest systematic method of technical analysis belongs to Dow's theory. Salehi et al. [26], the results obtained in this study are consistent with the documents mentioned in the theoretical framework of research and financial literature. This research sought to find solutions that have the ability to predict the content of profit information before the announcement to increase the speed of information transfer to the market and its absorption, which reduces the effect of information asymmetry and internal transactions and increases market efficiency. This research has achieved its goal in this field and has answered part of the research gap related to the research topic: the lack of tools and techniques for predicting the content of profit information before announcing it. Based on the results of the event test, the first hypothesis of the research was found that the declared quarterly profit of companies has an information content and is consistent with the results of the research of Akhgar and Dastgir [2], Arab Mazar and Jamalianpour [4]. Thus, the announcement of earnings leads to a change in stock prices around the weeks of the announcement of earnings, which is part of the price changes before the announcement of earnings. This is due to the disclosure or disclosure of confidential information prior to the official announcement of profit changes. These results are consistent with research by Atsalakis et al. [15], Pourzamani, and Rezvani [21] and did not match the results of the research of Saleh Ardestani and Varzaeshkar [34]. Based on the results of the second hypothesis of the research, Elliott's wave theory can predict the information content of profit before announcing it. This result can help investors and analysts make decisions and increase market efficiency by reducing the effects of confidential information, which is consistent with the view of Piotrowski's Joseph D. [33]

because all domestic trader profits come from a distance—the time between when he starts selling and when the market realizes what has happened. What is suitable for the capital market is transparency, while secret traders will benefit from a lack of transparency and ambiguity. Based on the results of the third and fourth hypotheses from the perspective of examining the effect of moderating variables such as company size and type of industry, it was found that it has no effect on the ability of Elliott's theory to predict the content of earnings information before the announcement. The findings of this study will be helpful to micro-investors who do not have access to confidential information about companies promptly, as well as capital market analysts and short-term investors and speculators, investment fund advisors, and stock traders. In order to reduce the effect of confidential internal transactions based on confidential information, legislators are advised to identify violations based on confidential information and develop timely detection methods for such transactions to increase market efficiency by increasing transaction transparency and reducing information asymmetry. According to the research results, it is suggested that marketers, portfolio managers, investors, and analysts use the Elliott wave theory to choose the strategy of buying, holding, and selling stocks at the time of the companies' quarterly earnings announcement, which, in addition to creating unusual returns, leads to a decrease. There are also effects of confidential information and increasing market efficiency. Legislators are advised to modify the method of announcing the quarterly profit of companies to the stock exchange and to minimize the time between the preparation of quarterly reports in publishing companies and public announcements, considering the proof of profit information content in quarterly reports. Analysts are advised to use other available analytical tools to predict earnings information content based on the results of this study and due to the profit content information of quarterly reports of publishing companies.

References

[1] Afshari Rad, E, Alavi, S., and Sinaei, H., Intelligent model for stock price forecasting using technical analysis methods, *Financial Research Quarterly*, 2018; 20(2):249-264. Doi:10.22059/FRJ.2018.233763.1006452

[2] Akhgar et al., Examining the information content of the components of the profit and loss statement and the cash statement, *Journal of Financial Accounting*, 2009; (3): 63-86 ,(In Persian).

[3] Allahyari, S. R., Using Fibonacci numbers to forecast the stock market, *International Journal of Management Science and Engineering Management*, 2012; : 268-279. Doi:10.1080/17509653.2012.10671232

[4] Arab Mazar Y., and Jamalianpour, Comparison of information content and usefulness of 3-, 6- and 9-month interim profit and loss statements in Tehran Stock Exchange, *Financial Accounting Research*, 2010: 4(6).(In Persian).

[5] Ballings, M., et al., Evaluating multiple classifiers for stock price direction prediction, *Expert Systems with Applications*, 2015; 42(20):7046-7056 . Doi:10.1016/j.eswa.2015.05.013

[6] Beaver et al., Increased Market Response to Earnings Announcements in the 21st Century: An Empirical Investigation, *Journal of Accounting and Economics*, 2020; Doi:10.1016/j.jacceco.2019.101244

[7] Beaver et al., The information content of earnings announcements: new insights from intertemporal and cross-sectional behavior, *Journal of Accounting and Economics*, 2018; 23: 95-135. Doi:10.1007/s11142-017-9417-z

[8] Davoudabadi, M., Mehrabanpour, M., Comparing Relative and Additive Contents of Return with Cash Recovery Rate, *Advances in Mathematical Finance and Application*, 2017; 2(1): 21-39 . Doi:10.22034/AMFA.2017 .529059

[9] Dogra et al, Is the worst of the COVID-19 global pandemic yet to come? Application of financial mathematics as candidate predictive tools, *Translational Psychiatry*, 2021; 11. Doi:10.1038/s41398-021-01429-0

[10] Duan, Huiming et al, Elliott wave theory and the Fibonacci sequence-gray model and their application in Chinese stock market, *Journal of Intelligent & Fuzzy Systems*, 2018; (34) 3: 1813-1825. Doi: 10.3233/JIFS-17108

[11] Drobetz, W., Kammermann, M., Wälchli, U., Long-Term Performance of Initial Public Offerings: The Evidence for Switzerland, *Schmalenbach Business Review*, 2005; 57: 253-275. Doi: 10.1007/BF03396716

[12] Eugenio D. A., Grimaldi G., The Effectiveness of the Elliott Waves Theory to Forecast Financial Markets: Evidence from the Currency Market, *International Business Research*, Canadian Center of Science and Education, 2017; 10(6):1-18. Doi: 10.5539/ibr.v10n6p1

[13] Faraji, O. et. al. ,Institutional Ownership, Business Cycles and Earnings Informativeness of Income Smoothing: Evidence from Iran, *Advances in Mathematical Finance and Application*, 2021; 6(2):303-319. Doi: 10.22034/AMFA.2020.1892989.1374

[14] Güngör Gündüz , Physical approach to elucidate stability and instability issues, and Elliott waves in financial systems: S & P-500 index as case study, *Quantitative Finance and Economics*, 2021; (95) :163-197. Doi: 10.3934/QFE.2021008

[15] G. S. Atsalakis, Dimitrakakis E. M., and Zopounidis C. D., Elliott Waves Theory and neuro-fuzzy systems, in stock market prediction: The WASP system, *Expert Systems with Applications*, 2011;(38) : 9196–9206. Doi:10.1016/j.eswa.2011.01.068

[16] Kamravafar M., Hashemi K., Recognize the main variables affecting the total capital market index of Iran and its modeling using artificial neural networks and comparing the results with technical analysis and Elliott waves, *Financial Engineering and Securities Management*, 2017; 8(30): 169-184,(in Persian).

[17] L.X. Wang, An Empirical Analysis of Eliot Waves Theory in China ‘s Futures Market, *China’s Foreign Investment*, 2012; 4: 253–254. Doi:10.1061/9780784480274.137

[18] Mokhtari K. D.; Gholami J. R., Effect of Conservative Reporting on Investors' Opinion Divergence at the Time of Earnings Announcement, *Advances in Mathematical Finance and Application* ,2018;3(2):81-95. Doi: 10.22034/AMFA.2018.540833

[19] Pakbaz et al, Investigating the predictive power of information content of accounting profit announcement by technical analysis signals, *Financial Management Perspective*, 2017;20: 87-112, (in Persian)

[20] Poretti et al. , Audit committees' independence and the information content of earnings announcements in Western Europe, *Journal of Accounting Literature*, 2018; 40:29-53 . Doi:10.1016/j.acclit.2017.11.002

[21] Pourzamani, Z.; Rezvani A., M. Comparison of the effectiveness of the combined strategies of technical analysis with the buying and holding method for buying stocks in ascending and descending periods, *Quarterly Journal of Financial Research, Securities Analysis*, 2017; 33(10): 17-31,(In Persian)

[22] Prechter, R. R., Elliott Wave Analysis. John Wiley & Sons, 2013.

[23] Rahmani, A.; Sarhangi, H., Analysis of Factors Affecting Trading Strategies Based on Stock Returns, *Financial Engineering and Securities Management (Portfolio Management)*, 2011;9 (2): 106-79. Doi:10.22034 /AMFA.2019.1870129.1235

[24] Qaemi M. H., Vatanparast, M. R., Investigating the role of accounting information in reducing information asymmetry in Tehran Stock Exchange, *Accounting and Auditing Reviews*, 2005;12(41):85 – 103, (In Persian).

[25] Seif , Samira et al , Predicting Stock Market Trends of Iran Using Elliott Wave Oscillation and Relative Strength Index, *Financial Research Journal*, 2021; 23(1):134-157. Doi:10.22059 /FRJ.2020 .310664.1007072

[26] Salehi et al, The information content of the declared and forecasted earnings per share in explaining the abnormal stock returns, *Financial Accounting and Auditing Research*, 2014; 6(21): 117 – 140,(In Persian).

[27] Tabar, saeed., Stock Market Prediction Using Elliot Wave Theory and Classification. Faculty of the Graduate College at the University of Nebraska in Partial Fulfillment of Requirements, *Information Technology Omaha*, 2018; 8(1):1-21. Doi:10.4018/ijban.2021010101

[28] Virtanen et al. Economic policy uncertainty and the information content of earnings announcements: Empirical evidence from the US in 1985-2018, 2020;

[29] Volna, K. et al., Multi-classifier based on Elliott wave's recognition, *Computers & Mathematics with Applications*, 2013; 66(2) :213-225. Doi:10.1016/j.camwa.2013.01.012

[30] William R. Scott, Financial Accounting Theory, *Library and Archives Canada Cataloguing in Publication* ISBN 978-0-13-298466-9,2015, (bound)

[31] Zhang et al., The Power of Firm Fundamental Information in Explaining Stock Returns, *Review of Accounting Studies, Forthcoming* ,2019, doi: 10.2139/ssrn.3697669

[32] Levin, J., Information and the Market for Lemons, *The RAND Journal of Economics*,2001; 32(4):657-666 . Doi: 10.2307/2696386

[33] Piotroski, Joseph D ,Roulstone, Darren T., Do insider trades reflect both contrarian beliefs and superior knowledge about future cash flow realizations?, *Journal of Accounting and Economics*, 2005; 39(1):55-81. Doi: 10.1016/j.jacceco.2004.01.003

[34] Saleh Ardestani, A., Varzaeshkar, H, Investigating and comparing the acquired return due to stock selection based on fundamental analysis and technical analysis in Tehran Stock Exchange, *Management Research in Iran*, 2015;19 (2), (In Persian).

[35] Trinh R., Ashton T., Evaluating the information content of earnings forecasts, *Accounting and Business Research* ,2018; 48(6):674-699. Doi: 10.1080/00014788.2017.1415800

[36] Vaghela, Vaidehi, et al, Elliott Wave formation using Hybrid Strategy of Stochastic and ADX Indicators, *IOSR Journal of Mathematics*, 2021, 12: 17-25. Doi: 10.9790/5933-1204011725

[37] Vaghela, Vaidehi, et al, Elliott Wave formation using combination of CCI and DEMA, *IOSR Journal of Mathematics*, 2021; 17: 14-21 . Doi: 10.9790/5728-1701011421

[38] Hejazi, Rezvan, et al, The Relationship between the Product Market Competition and Information Asymmetry; Structural Equation Modeling Approach, *Journal of Financial Accounting and Auditing* ,2021; 13: 119-148 . Doi: 20.1001.1.23830379.1400.13.50.5.2

[39] Ranjbar, H, et al, The Stock Market Reaction to Quarterly Profit Behavior of High-Tech Companies, *Journal of Interdisciplinary Studies in the Humanities* , 2021; 13:157-184 .Doi: 10.22035/ISIH.2021.373

[40] Nekounam , J. , Zanjirdar, M., Davoodi Nasr,M. , Study of relationship between ownership structure liquidity of stocks of companies accepted in Tehran Stock Exchange, *Indian Journal of Science and Technology*,2012;5(6): 2840-2845

[41] Mohamadi,M., Zanjirdar,M., On The Relationship Between Different Types Of Institutional Owners And Accounting Conservatism With Cost Stickiness, *Journal of Management Accounting and Auditing Knowledge*, 2018;7(28): 201-214

[42] Javaheri, M., Zanjirdar, M., The Relationship Between Profit Management and the Performance of Companies Studied in Bourse Securities of Tehran, *Productivity Management (Beyond Management)*,2017;11(42): 197-217