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Studying the Monthly Effect on the Market Reactions Using Time-Space -Frequency Analysis (Case Study: Tehran Stock Exchange)

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ABSTRACT

Anomaly is an incident or event that cannot be explained by the dominant theories. Anomalies are situated in confronting with the efficient market theory, so that it provides conditions for stock trading strategies with additional returns in case of existing predetermined returns. Therefore, in this study, the anomaly due to monthly effects on the stock volume trading and the Tehran Stock Exchange index volatility during the period from 2006 to 2016 is investigated. Two hypotheses are set and are tested using Space-Time-Frequency Analysis (continuous wavelet transform and short time Fourier transform).

The results of testing research hypotheses indicate that The Tehran Stock Exchange is inefficient. The volume of stock trading and the volatility of stock index in the first half of month are different from the second half of the month. Results also show that market tension in the first half of month is more than the second half of the month.

Keywords:

market anomaly, Monthly Effect, behavioral finance, Space-time-frequency analysis, market tension.

1. Introduction

No doubt that one of the main factors of production in any country is capital. Although the role of other factors, such as labor, natural resources, technology and management in production is very significant, the importance of capital is such that can affect other factors. Mobilizing public savings and allocating them to productive activities and creation of necessary facilities for public participation in the development of economically useful activities is exceptionally important.

Capital Market supplies required financial resources of production units by creation of diversity in financial instruments, provides needed facilities in order to transfer funds of people's savings to investment opportunities and facilitates transfer of available securities (Amir Aslani, 1997).

Since the flourishing stock markets have been emerged as an important criterion to measure economic development, economic and social impacts influence the economic and psychological balance of community. Active investors in the capital market are one of main constituent elements and their decisions play a decisive role in the capital market. According to existing approaches, Decision of Investors is not made only based on technical and rational analysis (Vadiee and Shokooh zadeh, 2012). More recent research in the case of financial psychology states that decisions of investors may be affected by internal behavioral factors such as Self- Knowledge and external behavioral factors like the way to choose an investment (Shleifer, 2000). Emotional and internal factors have a major role in individual decisions and can produce some effects on different financial markets. (Loewenstein, 2000 and Romer, 2000).

Emotional situation, internal states and specific cultural characteristics of each country have a significant impact on the interpretation and perception of risk and vague conditions and basically cause Intensification or weakness of other cognitive biases (Loewenstein et al., 2001). Expected utility theory explains that the economic factor apart from aspects of cognition encounters the risk and uncertainty. Moreover emotional states and behavior do not affect the investment decision. While in all conditions, emotional aspect is part of the overall human reaction and they cannot be separated from their feelings (Nikoomaram and Saeedi, 2008). Checking the effect of non-financial variables on the market response is one of the major and new topics in the field of financial knowledge which is referred to as behavioral finance.

The relationship between chronological periods such as days of the week, weeks of month and months of the year with the reaction of the stock market is of the exceptions in the financial markets that many studies have confirmed them in different countries. This effect Claims that there is inconsistency in the reaction of the stock market between some periods of the month, year and some days of the week with other periods or in other words, there are regular patterns in the time series behavior of these variables. Therefore, Excess and abnormal return can be obtained by developing Investment Strategies from these patterns. Research shows that the reaction of investors is different even in a month, for example, Ariel (1987) revealed that the average stock return for the first half of calendar months is significantly positive and it is zero for the second half of calendar months. He named this factor as "*monthly Effect*". Therefore, Days of calendar months may influence the behavior and feeling of people. The behavior of individuals may also influences their decision-making powers especially decisions taken in the stock market. Therefore, *monthly effect* is one of the factors in which it is expected to indirectly affect the response of the market. The recognition of difference in the market response at different times can be used as a strategy for time of entry to markets and exit from them by investment firms and Portfolio managers.

Given the importance of understanding and predicting the behavior of investors in different days of month, conducting a research to investigate *monthly effect* and possible effect of this rotation on market response and also answering the following questions and increasing our knowledge about the behavior of investors, can be a basis for studying behavioral patterns of investors and thus can provide a more accurate prediction indices.

Is there any empirical evidence about the *monthly effect* and the reaction of the stock market? Is it reasonable to assume that vision of investors in the first half of the month is different from the second half of that month? Also, one of the goals of this paper is examination and comparison of market stability in the middle of the first and second months of the calendar year. In the other words, it is checked that in which half of the month the market experiences more stress

and in which half, it has higher rate of calmness (stability) and since the concept of stress in the market correspond to the frequency of changes the signals of turnover and fluctuations in the stock index, using space-time-frequency analysis will be very useful to achieve this purpose. For this reason, the space-time-frequency analysis to examine the relationship between the *monthly effect* and market reaction is used in this research. It should be noted that no similar study (in the field of behavioral finance) using space-time-frequency analysis has been conducted, either internationally or at the domestic level. Among the most important advantages and implications of the above analysis in the field of behavioral finance, is the sustainability and instability examination of the relationships, in addition to the investigation of presence or absence of *monthly effect* on the market reactions.

2. Literature Review

Behavioral Finance

During the nineties, new branch of financial science named behavioral finance emerged and numerous articles were published in many scientific journals in this context. The basis of behavioral finance can be referred to 150 years ago. A number of books which were published in the nineteenth and twentieth centuries were the founders of this branch of financial science. Mackay Book (1980) with title of "Popular delusion and the madness of the crowds", which was written in 1841, Revealed that how the collective behavior is Impressive In financial markets. Lebon (1982) also in his book entitled" The crowd: a study of the popular mind" investigated the role of society in behavioral finance, Social psychology, Sociology and the history. Selden (1996) was one of the first people in 1912 that linked Psychological concepts directly to the capital market in his book entitled "The psychology of the stock market". In this book, Psychological and emotional factors on investors and activists of financial market was examined. The efforts of these people and other related studies shaped the foundation of Psychology and sociology in financial branches. The uniqueness of behavioral finance due to the community and joining several schools of thought Include schools of social sciences Such as psychology, sociology, anthropology and schools of business such as accounting, economics, finance, management and marketing. Current theories in the majority of the academic and financial communities are Standard or traditional finance theories. Most of these theories are in connection with the modern portfolio theory or the efficient market hypothesis. In modern portfolio theory, the relationship between expected return and standard deviation of a stock or portfolio and its correlation with other existing stocks in the portfolio is considered. Given these three concepts, an efficient portfolio can be formed for any number of shares or bonds.

Efficient portfolio is a group of securities that has maximum efficiency for certain level of risk or a minimum risk for specified level of return. In 1970, Fama also raised the efficient market hypothesis. According to this hypothesis, all information has been reflected in price of securities before and the price that securities are currently traded with is its fair value. As bonds have been priced at fair value, investors and traders cannot earn abnormal returns. Despite the success that these theories have gained, behavioral finance has been growing and has been proposed as a substitute for the standard theories. In literature subject, behavioral finance has appeared in various forms and has been studied.

Most economic theories have been founded according to the issue that states people act rationally in dealing with economic events. This theory is the main basis of the efficient market hypothesis. But researchers have undermined this fundamental hypothesis and they have discovered evidence that reflects lack of rational behavior in the investment topic. They look for explanation of human emotions' impact in the decision-making process (Khajavi and Ghasemi, 2006).

The way people interpret information to make informed investment decisions is studied in behavioral finance. In the other words behavioral finance seeks to influence psychological processes in decision making process, (Raee and Fallahpoor, 2009). In general, it can be said that classic finance considers people as rational, logical and profit-driven individuals and does not pay attention to other aspects of human, while behavioral finance claims that some behavioral models can be created. Behavioral finance that generally is interpreted as the application of psychology in finance has become an important topic especially after the bursting of the "price bubble of technology companies

stock "in March 2000. Behavioral finance models and interprets variable phenomena in a wide range of investors' behavior whether at the individual level or at the overall market level. Thus, behavioral finance is divided into two micro and macro categories.

1) Micro Behavioral Finance studies sympathies and biases of investors at individual level. So that they are no longer, "rational actors" posed in classical economics.
2) Macro Behavioral Finance identifies and describes anomalies of efficient market hypotheses which behavioral models can explain them.

Exceptions or anomalies are the events that cannot explain them via dominant theory. Many of these anomalies can be exampled in the natural sciences. In the stock market, anomalies are against the efficient market theory, so that if there are patterns of predetermined conditions, they provide the conditions for stock trading strategy with excess returns (over a certain amount of risk (Douglass & Motoshi, 1995). Anomalies of the efficient market theory can be expressed in two sets of calendar anomalies and other anomalies (non-anomalies).

Non-calendar anomalies

Anomalies and irregularities that made the efficient market hypothesis under question and cannot classify them in terms of seasonal irregularities are known as the calendar anomalies. In non- calendar anomalies the period of time is not the disruptive factor for the hypothesis of efficient market. However, the content factors of market form such as the inconsistent phenomenon (Fama and French, 2010). Here some of them are described. Some of the non-calendar anomalies include the effect of stock splits, the effect of the dividend, dividend per share, effect of stock with lower price, the effect of disseminating information, effect of Overreaction hypothesis, the effect of less reaction, the effect of a particular country, effect of initial public offerings and secondary public offerings, paradoxical of constant mutual fund, index effect and the effect of the delay in reporting the profitability and etc. can be mentioned.

Calendar anomalies

Much evidence about significant calendar models or in other words calendar anomalies in financial markets including stock and bond market, there is lots of evidence from the past half century until now. Also there are many debates about these patterns to identify, approve or reject them have been taken in scientific circles. Then a few of them are mentioned. Some of the calendar anomalies include; effect of political spin, the effect of summer holidays or the effect of working day before holidays, January effect (effect of year change) and the effect of December. Effects of days of the week and weekend, effect of working day, monthly effect and the effect of certain months after the lunar month and effect of Ramadan are also should be considered. Since the anomaly caused by the monthly effect, and the special country effects are examined in this study, their definitions are provided in the following.

Monthly Effect

Ariel (1987) examined month rotation for first time for USA stock index during the test 1981-1963; he uses the regression model with virtual variables to test his hypothesis. He divided stock exchange months into two parts so that half of each month starts with last working a day of the former month. Through studying the data related to New York Stock Exchange, he found that for the first half of calendar months, the averages of stock returns are significantly positive and for the second half of calendar months is zero.

Research Background

In the research literature, there are a few studies about the monthly effect on a capital market. In this section in addition to those studies, other papers which are partly related to the present research are reviewed.

Ahmeda et al (2016) study the methods of anomaly's detection in the financial field. They presented the method of clustering based on anomalies in their research and stated that this method was appropriate comparing to other methods to explain the anomalies. One feature of this method comparing to other methods, is the ability to predict anomalies when limited financial information is available.

Urquhart and Hudson (2016) through a study examined the interests of investors and their local biases using the event of "the Blitz." The results showed that on the bombardment of the city of London, the sentiment and returns were negative in the

market. Whereas the time that other cities were bombarded and London was not, the market did not show any reaction; that it reflects the effects of local prejudice.

Hui and Chan (2015) studied the effect of January and the effect of Halloween in America, Malaysia, China, Hong Kong, Canada, Germany, Japan, and Thailand. Their results indicated that Halloween has a significant effect on financial markets of America and Hong Kong, but had no significant effect on financial markets of other countries. Furthermore, the January effect was significant only in Hong Kong.

Al-Ississ (2015) studied the impact of religious events on the financial markets in Islamic countries. The results of his study showed that the month of Ramadan (especially the 27th and 29th of Ramadan) has a positive and significant impact on market returns. Furthermore, other results of this study indicated that the day of Ashura (in the Shia's countries) has a negative impact on the stock market.

Abbes and Abdelhédi (2015) reviewed the impact of Hajj on the willingness of investors to the stock exchanges. The results indicated that investor sentiment towards the market after the Hajj and Eid - Qorban (religious celebration day) is much more than before Hajj and Eid-Qorban celebration. Furthermore, market returns to the normal situation after Hajj pilgrimage. So, they reported that Hajj had a positive impact on sentiment and emotions of investors.

Halari et al (2015) examined anomalies based on the lunar Hijri calendar. The results showed that in the months of Ramadan, Shawwal, Dhū Al-Qadah and Rabi Al-Awwal, returns are positive and in other months of the year market returns are negative. Furthermore, the results showed that the volatility of returns relative to Ramadan, and Umada Al-Ula are lower than the rest of the months and in Shawwal, the return volatility is higher than in other months of the year.

Chordia et al (2014) investigated whether a new age has enhancement of liquidity and business activities undermine the credibility of abnormal returns of capital market. They found that the majority of anomalies in the market have fallen, and the average return of portfolio, which created based on anomalies strategy deceased 50% compared to the past. Furthermore, they stated the reason of this issue due to asset's management of investment funds, short-term interest and dense flow of stock.

Malini and Jais (2013) through a study examined the effects of pre-holiday effect and month effect of the approach of Islamic law in Indonesia and Malaysia. The results indicate that the pre-holiday affects significantly the stock exchange of Malaysia and Indonesia, which are based on Islamic law.

Alagidede (2013) in a study using GARCH models investigated the effects of months and holiday in the stock market in Africa. The results of his study showed that the effect of months is common in Africa, and there is a significant positive return in January in Ethiopia, Nigeria and Zimbabwe, and higher returns in February in Kenya and South Africa. The result showed that there is the effect of pre-holiday in South Africa, but this effect was not observed for the other countries surveyed.

3. Methodology

Research Hypothesis

This paper aims to study the Monthly effect on the market response using the space-time-frequency analysis. So, in order to achieve this goal, research hypotheses have been designed and developed as follows:

Hypothesis 1: Monthly effect has a significant impact on trading volume.

Hypothesis 2: Monthly effect has a significant effect on the fluctuations of the stock index.

Data Collection

Population of this study includes all listed companies in the Tehran Stock Exchange, which have been trading during the period of 2006-2016. In this study no statistical sample is estimated and all companies in the population are studied. This study is an applied and casual research. This method is used when researcher looks for the cause or causes of certain relations that occurred in the past and finished. Therefore, this type of research design has high external validity (Namazi, 2000).

For the purpose of data collection, the publications, books, and databases available are used. Furthermore, for the data analysis, data of the trading volume and index of Tehran Stock Exchange are also used. For this purpose, most of the required data are obtained through databases of Tehran Stock Exchange Organization, Variables of This study are calculated using Excel software (version 2011). For testing

research hypotheses MATLAB software Edition 2013 is used. Then the data of the measured variables to test hypotheses are analyzed using two types of space-time-frequency analysis (continuous wavelet transform). These analyzed will be discussed in the following.

Charts review of continuous wavelet transform

For the next two functions to display three-dimensional space is needed. Sometimes easier to display these functions, the third dimension to the color range is displayed. Wavelet output figures are provided with a color image representing the amplitude of the signal in question (in this study, stock index and trading volume) with resolutions (resolution capabilities lines) and during a time slot. The image can be considered as a two-dimensional function. Which one of the dimensions (vertical axis) corresponding to the scale, and its second (horizontal axis) corresponding to the time, and the colors of each pixel correspond to the amount of time and a certain scale wavelet functions, so that lighter colors correspond to higher values and darker colors are associated with smaller amounts. The scale or the vertical axis has inverse relationship with resolution, so that the display resolution is reduced as much as scale increases. For example, a three-day scale display has a resolution of more than eight-day scale. Wavelet Features are that provides a few resolution analyses.

On other word for wavelet, display of rate of change of the market is fast and slow. For example, three-day scale shows changes from three days to three days; the eight-day scale shows eight-day changes in eight days to eight days. Therefore, it can be said three-day scale corresponding to the fast changes of market rather than the eight-day scale which correspond to slower changes of market. Therefore, display's wavelet can provide the rate of changes with different resolutions, and with wavelet display can also examine fast and slow changes of market.

Figure 1 is an output picture of the continuous wavelet which has been examined in scale of one to ten days and the period of 180 days. Suppose a certain scale (e.g. three days) to investigate

If in the chart, the three-day scale moved forward the wavelet three days and over the time (e.g.180 days); clearly the function is not constant. In other words, the colors display corresponding to the value of the function, are light and dark. This means that a switch from three days to three days in the market over the time (e.g. 180 days) is not fixed. If you need to review this change for different time, the time intervals should be separated and wavelet values for certain desired resolution (here, in three days) in the two periods to be compared. To do so, the amount of the wavelet during two intervals are summed and compared together. If the two amounts are different, the hypothesis is confirmed, otherwise hypothesis is rejected. The point that must be noted is that the values obtained and charted are a measure of the rate of change of the market.

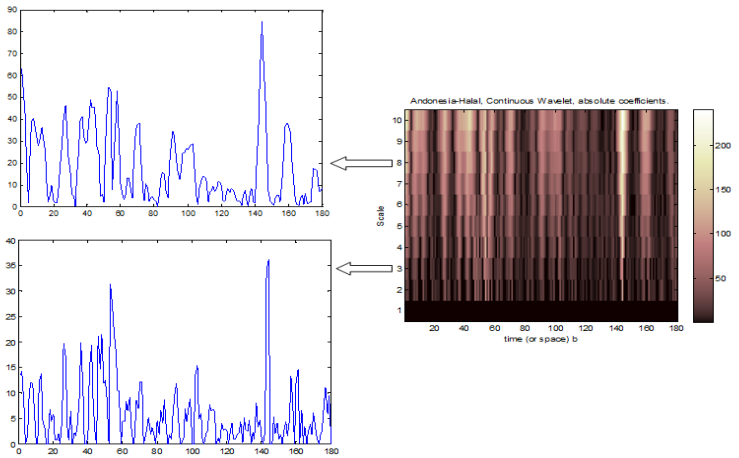

Figure 1: An image from the continuous wavelet output

Therefore, they are quite relative concepts, and they alone are meaningless and only are analyzed in comparison with other tables. For example, by comparing the rate changes of two days for the first half and the second half of a month, can compare the fast tension (two days) of market in the two periods, and by comparing the rate change of ten days to ten days, slow tensions in the market for such range will be comparable.

The results of short-time Fourier transform are very similar to Wavelet outcomes in terms of investigation but the vertical axis shows the time unlike Wavelet that the horizontal axis was indicator of time. In addition, the other axis Shows Frequency Instead of displaying the scale, which has inverse relationship with the scale (Frequency is obtained of a division of one by the scale). So, Greater frequencies Represent higher resolution and vice versa. So there is also a multi-resolution display in the short-time Fourier transform.

Finally, to achieve a general conclusion based on tested research hypotheses, the index of volatility trading volume and the volatility of stock index of first half of the month, the second half of the month and difference between volatility index of the first half and second half of each month at different scales once a day (that is a measure of tension and fast fluctuations) up to ten days (which are a measure of the tensions and slower and gentler volatility) is provided.

If the difference between the indices of the first half and the second half is positive, it indicates that the fluctuation in the first half of a month is more and if this difference is negative, it indicates that the fluctuations in the second half of the month is more and if the difference is zero, it indicates no difference between the first and second half of a month.

4. Results

Testing Hypothesis (1)

Hypothesis 1: Monthly effect has significant effect on trading volume.

The results of testing Hypothesis (1), using a continuous wavelet transform is presented in figure 2.

In this figure, Vertical axis represents scale and the horizontal axis represents time. It can be observed in figure 2 that the amount of function is not constant at different time scales and fluctuates. In the other words, displaying colors turn light and dark due to value of the function. It means that changes in turnover at various time scales are not constant; therefore, the research hypothesis can be confirmed.

Due to integration of information in period of ten years and density of information in figure 2, data for one year is separately extracted and presented in figure 3. Based on the information in figure 3, it can be concluded that turnover fluctuations in the first and the second halves of each month are different at Tehran Stock Exchange.

Fluctuation index of turnover has been presented in Table 1.

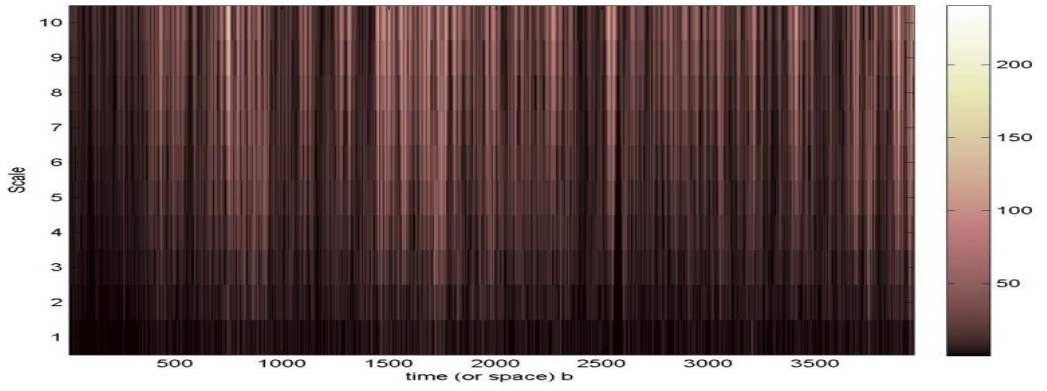

Figure 2: Results of testing first hypothesis using the continuous wavelet transform

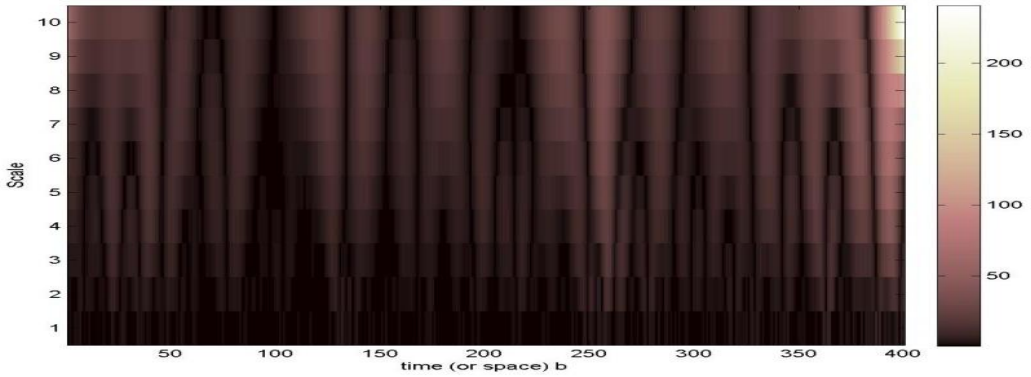

Figure 3: results of the first hypothesis test using the continuous wavelet transform for one year

Table 1: Results of Continuous wavelet transform test at various time scales

Scale	First half of month	Second half of month	Difference
One day	98,962.12	99,842.65	(880.52)
Two days	210,909.07	207,843.42	3,065.65
Three days	335,567.14	327,716.67	7,850.47
Four days	468,305.98	449,115.71	19,190.27
Five days	590,325.70	573,760.98	16,564.72
Six days	702,889.83	692,545.67	10,344.16
Seven days	815,811.02	802,910.98	12,900.03
Eight days	932,065.04	907,181.98	24,883.06
Nine days	1,016,661.56	1,053,600.23	(36,938.67)
Ten days	1,136,981.21	1,183,471.03	(46,489.81)

Source: researcher calculations

By comparing obtained criteria of Continuous Wavelet transform method which is shown in Table 1, it can be concluded that turnover fluctuations or index volatility in scale of two to eight days in the first half of the month are more than second half, while turnover fluctuations in the second half of the month is more than first half in other scales.

Actually, it can be expressed by filtering one-day scale that changes in the second half of month are slower and moderate (associated with larger time scales) and fluctuations and changes in the volume of transactions are relatively fast in the first half of month. So it might be stated that the Monthly effect has a significant impact on trading volume.

Testing the second hypothesis

Hypothesis 2: Monthly effect has significant effect on the volatility of stock index.

Short-time Fourier transform method is also used in addition to implementing continuous wavelet transform to investigate rotating effect of the month on the fluctuations of stock index in order to achieve better and more reliable results. The results of testing hypothesis (2) are presented in the figure 4 using continuous wavelet transform.

In this figure, vertical axis represents scale and the horizontal axis represents time. Data in Figure 4 reveals that function is not constant at different time scales and fluctuates. In other words, displaying colors turn light and dark according to value of the function. This means that the volatility of stock index in the various time scales is not constant; therefore research hypothesis can be confirmed.

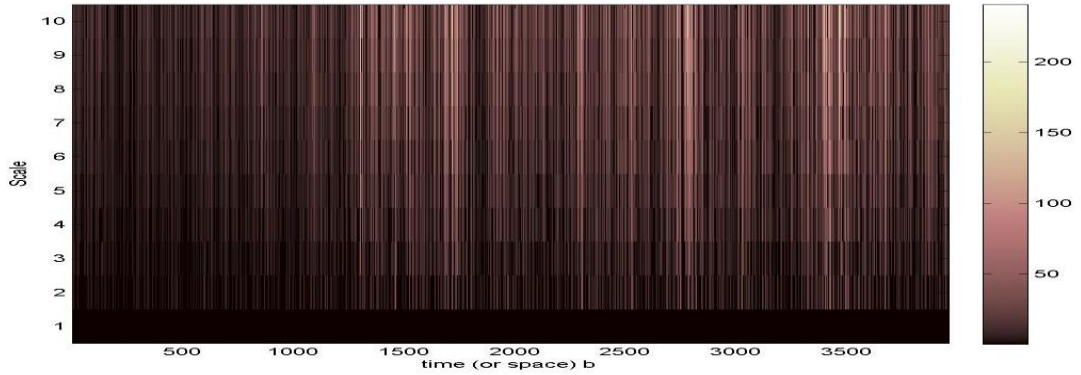

Figure 4: Results of testing hypothesis (2) using the continuous wavelet transform

Table 2: The results of continuous wavelet transform test in the different time scales

Scale	First half of month	Second half of month	difference
One day	0.00	0.00	0.00
2 days	23,221.48	24,376.53	(1,155.05)
3 days	32,242.24	29,704.21	2,538.03
4 days	50,992.99	46,796.19	4,196.80
5 days	60,912.89	56,535.35	4,377.55
6 days	77,367.44	71,745.54	5,621.90
7 days	87,617.79	82,249.83	5,367.96
8 days	103,263.57	97,271.34	5,992.23
9 days	114,266.81	107,821.11	6,445.69
10 days	128,920.45	121,723.17	7,197.27

Source: researcher calculations

Comparing the output of the Continuous Wavelet transform method which is shown in table 2, It can be concluded that volatility index of stock index in the scale of one day is the same in the first and second half of the month. In the two-day time scale, fluctuations in stock index in the second half are more than first half while fluctuations of stock index in the first half are more than second half in other scales.

In fact, it can be stated that with the exception of a two-day changes in which the fluctuations of the stock index in the second half is more than first half, rapid changes of stock index (associated with smaller time scales) and slow and moderate changes (associated with larger time scales) in first half are more in comparison with the second half. Therefore, it can be stated that the *monthly effect* has a significant impact on the fluctuations of the stock index.

Outcomes of testing hypothesis (2) are presented in figure 5 by using short-time Fourier transform.

In this figure, unlike the continuous wavelet transform, vertical axis presents the time and the horizontal axis represents frequency. It can be seen in the figure 5 that the amount of function is not constant and varies at different frequencies. In other words, displaying colors corresponding to the value of the function turn blue and red. This means that the fluctuations of stock index are not constant in the different frequencies; thus the research hypothesis can be confirmed.

Figure 5: Results of testing hypothesis (2) by using the short-time Fourier transform

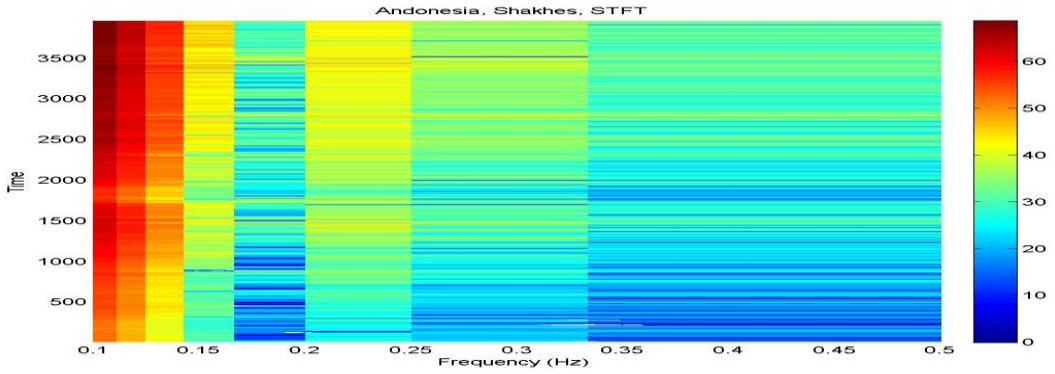

Table 3: results of testing short-time Fourier transform at different frequencies

Frequency	First half of month	Second half of month	Difference
0.1 (Equivalent to Scale of 10 days)	427,901.14	426,757.50	1,143.64
0.15 (Equivalent to Scale of 9 days)	255,694.55	254,120.73	1,573.83
0.2 (Equivalent to Scale of 8 days)	116,063.61	114,298.71	1,764.90
0.25 (Equivalent to Scale of 7 days)	30,665.35	29,094.53	1,570.82
0.3 (Equivalent to Scale of 6 days)	8,863.83	7,850.79	1,013.04
0.35 (Equivalent to Scale of 5 days)	23,417.56	23,113.27	304.30
0.4 (Equivalent to Scale of 4 days)	12,257.24	11,687.86	569.38
0.45 (Equivalent to Scale of 3 days)	7,378.75	7,271.31	107.44
0.5 (Equivalent to Scale of 2 days)	28,544.08	28,972.59	(428.50)

Source: researcher calculations

By comparing the obtained measures of the Short-time Fourier transform method which is shown in Table 3, it can be indicated that fluctuations in stock index in the second half of month is more than the first half in frequencies equivalent to two and six days while volatility of stock index in the first half the month is greater in other frequencies.

In fact, it can be indicated that with the exception of frequencies equivalent to six days, whether changes in stock index are rapid (associated with greater frequencies) or they are slower and moderate (associated with smaller frequencies), these changes in the first half of month are more than the second one.

By investigating the outcomes of two approaches including continuous wavelet transform and short-time Fourier transform, it can be expressed that with the exception of six-day scale (equivalent to frequency of 0.3) the results of two methods are different. The outcomes of both of approaches confirm each other.

5. Discussion and Conclusions

The purpose of this research was to investigate the Monthly effect on the reaction of investors of companies listed in Tehran Stock Exchange using the space-time-frequency analysis. Two hypotheses were tested in this regard. Based on the results of the analyzing the research hypotheses, both hypotheses are confirmed. Research hypotheses are a reflection of the Ariel's views (1987). According to this researcher's opinion, the reaction of investors in the first half of calendar months (first 15 Days of month) is different from the second half calendar months (second 15 days of month). Soltanifard (2011) also surveyed the monthly effect in Iranian capital market using questionnaire and reached the same result as Ariel's Research (1987).

The findings of testing research hypotheses, by introducing space-time-frequency models as different approach compared to the traditional testing models,

indicate the fact that volatility of stock index and trading volume of stocks in the first half and the second half of the calendar month are different in the Tehran stock exchange. Therefore, The findings confirm comments and results of Ariel (1987) and Soltanifard (2011) studies, which investigated monthly effect on the fluctuations of stock indices. Thus, according to the results of tested research hypotheses, we can conclude that:

A. Efficiency of Tehran Stock Exchange is weak, due to the presence of anomaly that indicates weak level of efficiency of the market,
B. B) The Tehran Stock Exchange has more tension in the first 15 days of the month, and moderate fluctuations have been observed in the second half of the stock index.

According to the findings of this study, the following suggestions are offered to investors, the securities and stock exchange organization and listed companies:

1. Due to the monthly effect on the reaction of investors; it is suggested to different investors to consider trading in the first or second 15 days of calendar month when deciding to buy and sell stocks, in addition of taking financial and non-financial variables into account.
2. Due to the weak level of Tehran capital market efficiency (based on the past studies in Iran and existence of market anomaly), improving regulatory procedures, rules reform, having more stability in the policies and establishing appropriate mechanisms to provide informative data can help investors to improve their decision making by studying different anomalies rather than making decisions based on financial and non-financial data. Therefore, it is suggested that comprehensive and suitable information system is created by the stock exchange, to provide necessary timely and appropriate information to the users.

Also, in order to do further research in connection with this study, the following topics are suggested:

1. Repeating this research considering the reaction of investors in the various industries.
2. Using space-time-frequency analysis to study the reaction of investors in different hours of the day.
3. Using space-time-frequency analysis for reviewing prohibited (Haram) and non-prohibited months on the reaction of investors.
4. Evaluating the process of month rotation influence on the reaction of the investors in the Stock Exchange.

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