Adv. Math. Fin. App., 2024, **9**(1), P. 33-51

Advances in Mathematical Finance & Applications

www.amfa.iau-arak.ac.ir

Print ISSN: 2538-5569

Online ISSN: 2645-4610

Doi: 10.22034/AMFA.2021.1919729.1544

Research Paper

Investigating the Effect of Stock Tendency of Stock Collision to Fluctuation Limit and Price Fluctuation Threshold and Change the Basis of Fluctuation Limit in Creating Returns Fluctuations

Mahdieh Farahbakhsh [a], Majid Zanjirdar [b,] *, Ibrahim Jahangirnia[a], Mojgan Safa[a]

[a]*Department of Accounting, Qom Branch, Islamic Azad University, Qom, Iran*

[b]*Department of Financial Management, Arak Branch, Islamic Azad University, Arak, Iran*

ARTICLE INFO

Article history:

Received 2021-01-04

Accepted 2021-04-19

Keywords:

Yield Fluctuations Share

Fluctuation

Fluctuation Price Threshold

Abstract

The purpose of this study is to identify the effect of stock tendency to deal with fluctuations and price fluctuation thresholds in creating fluctuations. The statistical population of the present study is the companies listed on the Tehran Stock Exchange that were present in the stock exchange during the years 2005 to 2018. In order to confirm and reject the research hypothesis, Eviews software has been used. In Tehran Stock Exchange, following severe stock price fluctuations, the stock price fluctuation mechanism is used to limit severe stock price fluctuations, and according to certain periods, the range of stock price fluctuations changes and over time the range of fluctuations increases. The basis of trial and error has been determined and in a short period of time there have been many changes in the procedures related to the application of stock price fluctuations, without really measuring the impact of these decisions in the market and investors' reaction to changes in price fluctuations. Findings showed that the number of times each share hits the price fluctuation Yield fluctuation has a significant effect.slow efficiency fluctuations have a significant effect; And in line with the concepts of hyper-reactive theory, it can be justified, that is, after the price reaches the range of fluctuation, the trend reverses and the basis of the fluctuation limit changes; It has changed the volatility of stock returns based on jump and price continuity. Also, the findings of this study are in line with the hypothesis of fluctuations, according to which increasing the stock price volatility limit will cause more stock price volatility in the coming days.

1 Introduction

According to domestic researches, despite the research done to clarify and help the literature, and also because of the importance of the issue of fluctuations in returns in investors' decision-making and that in case of high fluctuations in the company's stock price, investors refuse to invest in their stocks, which affects both the market and companies. The present study is neces-

* Corresponding author. Tel.: 09181621711

E-mail address: *zanjirdar08@gmail.com*

sary due to research gaps and related reasons. [4] found that price constraints tended to exacerbate stock market fluctuations. [5] shows that price constraints have no effect on market stabilization in the presence of any simultaneous bias; [21] stated that the cooling effect of price constraints appears for both allowable and low intervals. And the cooling effect of lower interval is stronger than high interval which the results are different. The difference in neutral latency between the uptrend and the downtrend is very small. In this research, based on hyper-reactive theory, it focuses on using price constraints as an effective and key factor in price jumps. The main purpose of this study is to identify the effect of stock tendency to deal with fluctuations and price volatility thresholds in creating fluctuations. In fact, as an important policy tool for financial regulators, the price constraints determine the maximum price or value limits that can be raised or lowered overnight to protect against overreaction which can lead to severe market price fluctuations. Regarding market psychological stimulation and emotional behavior, it should be said that this is one of the characteristics of a semi-professional market; therefore, the existence of some restrictions in this type of market prevents heavy losses to people in a very short time. In Tehran Stock Exchange, following severe stock price fluctuations, the stock price fluctuation limit mechanism is used to limit severe stock price fluctuations and based on special periods of time, the domain of stock price fluctuations will change and over time, the fluctuations domain are determined based on trial and error and there have been many changes in the procedures for applying stock price fluctuations limit, without really measuring the impact of these decisions on the market and the reaction of investors to changes in the domain of price fluctuations. [9] given that disruptor traders are unaware and tend to overreact, may raise or low the prices, and thus increase the rate of return on volatility.

These two additional features may lead to concerns that such an inverse causality may have adverse consequences on the results of previous studies regarding the impact of price stabilization [5] since the research that comprehensively provides a model in this regard has not been done in this field and the relationship between the number of times each share is subject to price fluctuations and the number of times each share encounters the threshold of high and low price fluctuation limit with the return fluctuation has not been considered. In the present study, the effect of changing the basis of the fluctuation limit on the change in the fluctuation of stock returns based on price jump and continuity also will be considered, all of which indicate the novelty and innovation of the present study.In previous researches, different solutions have been presented in this field. [6], and [18], found that price constraints tend to exacerbate stock market fluctuations [4], show that while the pattern of variance between different price values does not provide a clear picture of the problem, the components of jumping at limited price intervals are significantly reduced. Contrary to previous research. Investors and shareholders using the research results can understand the importance of stocks' tendency to deal with price fluctuation and their role in creating fluctuation returns. In this research, an attempt has been made to present a plan by stating the different parts of the study. For this purpose, in this research, the generalities of the research design are identified with an introductory statement, and then the theoretical foundations and review of research background, hypotheses, research methodology, statistical population and sample selection, data analysis and hypothesis testing are discussed. At the end, a conclusion and discussion are presented. According to the contents presented in this section, the research question is formulated as follows: What is the effect of stock tendency of the stock deal with the fluctuation limit and price fluctuation threshold and changing the basis of the fluctuation limit in creating returns fluctuations?

2 Theoretical Foundations and Research Background

According to the hyper-reactivity theory proposed by [6], which assumes that investors tend to overreact to good (bad) news and push stock prices to more (less) than their equilibrium price. Over time and analysis of information by investors, the market realizes its mistake and the price returns to equilibrium. Hence, we will see a return of price in the market. Many stock exchanges have established rules and procedures for dealing with events that can lead to sharp price fluctuations. One of the most important rules, especially in emerging markets, is the price limit. The daily price volatility limit has two characteristics that control fluctuations: it limits the price and also provides an opportunity to re-evaluate information in a crisis situation. The range of price fluctuations gives excited traders the opportunity to relax and make more sensible decisions. Critics of price fluctuation limit claim that using the price limit creates at least three problems: spread of fluctuations to the future, delaying in reaching to the actual price, and interfering with transactions. The price limit is expected to affect these stocks when they have high real returns. Researchers have different views on stock price fluctuation, and the positive or negative effects of stock price fluctuation have not been conclusively proven. Proponents of stock price fluctuation apply claim that imposing these restrictions reduces price volatility, counteracts over-reaction by shareholders, and does not interfere with transactions. Critics, on the other hand, claim that the stock price fluctuation limit will cause the stock price to fluctuate further in the coming days (the hypothesis of spread of fluctuations), prevents the stock price from reaching the equilibrium level (the hypothesis of delay in reaching the real price), causes overreaction by investors (hypothesis of overreaction) and interferes in trading by limiting stock prices (hypothesis of interference in transactions).

Also, according to the magnetism effect theory by [4], it indicates that the limits of price fluctuations act like magnet and attract prices, and investors due to fear of lack of liquidity of shares and inability to trade and being locked in their trading position will try to present their supply and demand in the authorized domains. Its assumptions state that if prices reach the permissible thresholds, a buy or sell queue will be formed and it will not be possible to trade on that day. As a result, when prices approach the permissible thresholds, the fluctuation limit acts like a magnet and pulls prices closer and closer. Baseti Rad and Yazdani showed that there is a relationship between liquidity, financial leverage, cost sales growth and stock returns fluctuations. The results indicate that these variables have a higher impact on stock returns than stock price fluctuations [2]. The results of Dehghan et al indicate that the momentary decision is the effect of long-term return on stock price fluctuations and value expenditure from the perspective of price-to-earnings per share ratio, the effect of size, and the effect of loss avoidance [6].

Akhgar and Mirzaei stated that the life cycle of the company has a significant effect on fluctuations in stock returns of companies. The specific fluctuations of companies' stock returns during the introduction and decline stages are greater than the growth and maturity stage [1]. Fallah Shams and Eskandari in examining the role of asymmetry on the emergence of effect of abduction in stock price fluctuation limit, show that among the companies surveyed, there is an abduction effect in price fluctuation and there is a relationship between information asymmetry and the effect of abduction [7]. Shafiei et al also examined the effects of control laws and especially the stock price fluctuation limit in the Iranian Stock Exchange and examined its aspects [18]. Zarei and Moradi found that there is a relationship between earnings per share variables and stock price fluctuations limit with turnover and these relationships are different in companies with high and low growth and large and small size. [4]. Manjezab and Ali Mohammadi in examining the allowable range of fluctuations in the Tehran Stock Exchange: its effects, dimensions and analysis, addressed one of its most important and recent effects called the abduction effect using a regression model. [14]. Kashanipour et al show that a 3% reduction in the stock price fluctuation limit on 08/21/2005 and has increased the volume of transactions and stock returns of companies; And a 3 and 0.5 percent increase in the stock price fluctuation on 12/09/2005 and 08/16/1388 has reduced the stock returns of companies, but has not had an effect on the turnover of companies [10]. Osman et al in examining the fluctuations around the price limit found that the fluctuations after dealing with the price fluctuation limit near the beginning of the first trading session are lower and for deals above the price limit near the end of each trading session, it is unchanged. [9]. Kin et al show that when the market collapses, the price hits the ceiling and when the stimulus circuit is wider in the market, the magnetic effect of the price ceiling accelerates. [22]

Nasser et al in a study entitled Fuzzy Random Step Technique to the Forecast Fluctuations of the Iran Stock Exchange Index showed that the method is based on a random walk using a fuzzy logic approach. This method is used to predict the instability of the Iran Commodity Exchange index. The proposed method is evaluated by comparing other methods such as average movement, random walking ... The results show that our proposed method is compatible with existing methods. [15]. Chu et al found that while the pattern of realization of variance between different price values does not show a clear picture of the problem, the components of jumping at limited price intervals are significantly reduced, contrary to previous researches, which state that price constraints do not affect market stabilization in the presence of any simultaneous bias. [5]. Rezaei and Elmi in a study entitled Financial Behavioral Models and Behavioral Biases in Stock Price Prediction showed that there is the probability of being in high (excessive) and low volatility regimes (affected by stock prices despite the shock brought to the stock exchange). It turned out that the real stock price is no different from the market price. [17]. Wan et al found that the cooling effect of price constraints appears allowable to both intervals and low intervals, and that the cooling effect of lower intervals is stronger than that of high intervals. [21]. Kim and Jun in examining the impact of price constraints on market stability on the day of the daily market horizon, have examined the changes and developments after the price change to examine the overall effects of change in daily market fluctuations. [11]. Lane et al in examining the information segregation, price constraints, and earnings momentum found that if the benefit of accelerated earnings was influenced by investors, it could be stronger among stocks with more consistent information that investors have overlooked. [13].

Farag in examining the effect of price constraint on overreaction in emerging markets: Evidences from the Egyptian stock market found evidences of abnormal overreaction in the Egyptian stock market and showed that accordingly small companies compared with large companies in the post-event period tend to be more prone to price returns and reflect clear evidences of stock market deficiencies as a result of the applying of different price restriction systems. [8]. Kim and Yang examined the effect of stock price fluctuation limit on daily price fluctuation and information asymmetry and stated that stock price fluctuation limit can have a magnetic effect instead of the role of stabilizing and calming the market and push the price towards the fluctuation limit and the price fluctuation limit increases the hyper-reactive phenomenon when the price approaches the limit. [12]. Berkman and Lee concluded that the effects of price limit widening on small firm fluctuations have been more severe, and the effect of the size factor justifies that in many developing stock markets, the more limited fluctuation limit is used. [3]. The study investigates the effect of the widened daily stock price limits on the usefulness of accounting information in Korea. The study investigates the effect of the widened daily stock price limits on the usefulness of accounting information in Korea: 1) This tendency was more evident in companies with higher debt ratios and companies with lower levels of income smoothing, which is considered to have higher risks. The findings suggest that it is the first study evaluating the effect of widening daily stock price limits, made on June 15, 2015, on the usefulness of audit quality information by examining the relevance between audit quality and stock return. [24]

Liu et al Leverage analysis of carbon market price fluctuation in China. this paper adopts the leverage stochastic volatility (SV-L) model to characterize the price volatility of the five pilot carbon markets in China. We first make a Bayesian inference for the SV model, then construct a Monte Carlo calculation process based on Gibbs sampling for empirical analysis, and finally compare the SV-L model with the normal stochastic volatility (SV–N) model. The results show that the carbon price fluctuations of the five pilot markets are quite different. Among them, Shenzhen, Guangdong, Shanghai, and Beijing have a "positive leverage effect", and Hubei has an "anti-leverage effect". Through comparative analysis, we find that the SV-L model is superior to the SV-N model in terms of the degree of data fitting and simulation ability. Finally, we offer suggestions on the development of China's unified carbon market. [25]

This paper aims at examining the cross-correlation between financial stability and real estate price fluctuation in China. A measure of financial stability is constructed and the cross-correlation between financial stability and the real estate market is demonstrated by using detrended cross-correlation analysis (DCCA). Furthermore, multifractal asymmetric detrended cross-correlation analysis (MF-ADCCA) is used to evaluate the scaling properties of the cross-correlation among financial stability and real estate price fluctuation. Empirical results indicate that asymmetries exist in the cross-correlation and that the asymmetric cross-correlation is multifractal. The cross-correlation is related to the fluctuation magnitude if the financial stress index (or the growth rate in house prices) is in a different trend. Finally, DCCA analysis based on time-delay is employed to investigate transmission direction of the cross-correlation. Our findings indicate the transmission direction is bidirectional, but the impact of financial stability on real estate price fluctuation is larger than the impact in the reverse direction. [26]

3 Hypotheses

According to the presented theoretical framework and background, the research hypotheses are presented as follows:

Main Hypothesis 1: There is a relationship between the number of times each share deals with the price fluctuation limit and the returns fluctuation.

Main Hypothesis 2: There is a relationship between the number of times each share deals with the threshold of high and low price fluctuations and the returns fluctuation.

Main Hypothesis 3: Changing the basis of fluctuation limit has changed the stock returns fluctuation based on price jump and continuity.

Hypothesis 3-1: Changing the fluctuation limit basis from 5% to 2% has reduced the stock returns fluctuation based on price jump and continuity.

Hypothesis 3-2: Changing the fluctuation limit basis from 2% to 3% has increased the stock returns fluctuation based on price jump and continuity.

Hypothesis 3-3: Changing the fluctuation limit basis from 3% to 3.5% has increased the stock returns fluctuation based on price jump and continuity.
Hypothesis 3-4: Changing the fluctuation limit basis from 3.5% to 4% has increased the stock returns fluctuation based on price jump and continuity.
Hypothesis 3-5: Changing the fluctuation limit basis from 4% to 5% has increased the stock returns fluctuation based on price jump and continuity.

4 Research Methodology

This applied-descriptive research was conducted with a correlational methodology. Data were collected using the library research method and references to financial statements, balance sheets, and BourseMagazine. Data description and summarization were carried outusing descriptive and inferential statistics. Data were initially analyzed using the variance heterogeneity pretests, F-Limer test, Hausman test, andJarque-Bera test. In addition, the multivariate regression test was used to confirm or reject the research hypotheses in the EViews software.

4.1 Statistical Population and Sample Selection

The statistical population of the study includes companies listed on the Tehran Stock Exchange in the period between 2005 and 2018. In the present study, in order to determine the statistical sample, companies first become homogeneous by the method of systematic removal and after homogenizing the statistical population by the method of systematic removal from the homogenized community is used as a research sample. The criteria used in the systematic elimination method in order to homogenize the statistical population are as follows. For this purpose, those companies in the statistical community that meet the following conditions are selected as a statistical sample and the rest are eliminated.

Table 1: Selection of the statistical community with restrictions

532Companies	Number of companies on the stock exchange until the end of 2018
Companies (132)	Number of companies in the dates 2006/06/02 - 2005/12/14 2008/02/09 - 2006/06/02 2010/01/10 - 2008/02/09 .6/4/2005 to 12/29/2018 were not present in the stock exchange
Companies (77)	Number of companies whose fiscal year does not end at the end of March or have changed fiscal year in the study period
Companies (43)	Number of companies that have not been traded for at least 30 weeks in each of the two one-year periods before and after the stock price change.
Companies (72)	Number of investment companies, banks and insurance companies
Companies (29)	Companies that have not provided the financial information required for the research
Companies(412)	Total
175Companies	Number of companies whose data was collected (final population(

The statistical sample obtained by Cochran's formula is equal to 120 data. For each variable of this research, 1560 data-years have been collected to test statistical hypotheses.

4.2 Research models and variables

In the present study, to test the first hypothesis, the regression model (1) is estimated:

$$RV_{i,t+1} = \beta_0 + \beta_1 NPLH_t + \beta_2 RV_{i,t} + \beta_3 RV_t^{m-1} + \beta_4 RV_t^m + \beta_5 LEV_t + \beta_6 VOL_t + \varepsilon \tag{1}$$

H_0: β_1=0

H_1: $\beta_1 \neq 0$

Stock returns fluctuation in the future period; NPLH i,t: the number of trading days when the company's stock price deals with the permissible price fluctuation thresholds; : Current period fluctuations; : the realized stock returns fluctuation (standard deviation of last year's monthly returns) which is examined through model (2):

$$RV_t^{m-1} = \sqrt{\frac{\sum(r_{im-1} - \overline{r_{im-1}})^2}{n-1}} \tag{2}$$

The realized stock returns fluctuation (standard deviation of the current year monthly returns) which is examined through model (3):

$$RV_t^{m} = \sqrt{\frac{\sum(r_{im} - \overline{r_{im}})^2}{n-1}} \tag{3}$$

Lev i,t: financial leverage; Vol i,t: turnover

To test the second hypothesis, the regression model (4) is estimated:

$$RV_{i,t+1} = \beta_0 + \beta_1 UPLH_t + \beta_2 LPLH_t + \beta_3 RV_{i,t} + \beta_4 RV_t^{m-1} + \beta_5 RV_t^m + \beta_6 SJV_t + \varepsilon \tag{4}$$

H_0: β_1,β_2=0

H_1: β_1,$\beta_2 \neq 0$

stock returns fluctuations in in the future period; UPLHt:: Frequency of stock price deals with high price fluctuation threshold; LPLHt: Frequency of stock price deals with the low price fluctuations threshold; : stock returns fluctuation (stock risk) in the current period; : realized monthly stock returns fluctuation (standard deviation of monthly returns during the last year); : realized stock returns fluctuation (standard deviation of monthly returns during the current year); SJV i,t: jump instability.

To test the third hypothesis of fluctuation, sub-hypotheses are defined:

H0: $\delta 1 \geq \delta 2$

H1: $\delta 1 < \delta 2$

$\delta 1$: stock return fluctuation based on jump and continuity components for initial fluctuation limit; $\delta 2$: stock return fluctuation based on jump and continuity components for secondary fluctuation limit; to prove this hypothesis, Tukey test is used and in the following, the dependent variable method measuring of the research is presented:

A- Return fluctuation (): indicates the realized stock return fluctuation as a stock risk measuring index and can be measured by the standard deviation of stock return in the next year.

B- Stock returns fluctuation based on price jump and continuity: the realized fluctuation can be divided into two components of jump (j) and continuity (C). So that if there is a jump during the calculated period, the value of C will be equal to BPV and otherwise equal to RV during that period, which is as described in model (5):

$$RV_{i,t+h} = \beta_0 + \beta_{CD}C_{t-1,t} + \beta_{Cw}C_{t-5,t} + \beta_{Cm}C_{t-22,t} + \beta_{JD}J_{t-1,t} + \beta_{JW}J_{t-5,t} + \beta_{JM}J_{t-22,t} + \varepsilon \quad (5)$$

Represents the realized fluctuation between t and t + h and according to model (6) we have:

$$RV_{t,t+h} = h^{-1}\left(RV_{t,t+1} + RV_{t,t+1,t+2} + \cdots \ldots \ldots .. + RV_{t+h-1,t+h}\right) \quad (6)$$

The realized fluctuation also is measured according to model (7):

$$RV_t = \sum_{j=1}^{m} r^2_{t-j\Delta} \quad (7)$$

$$r_{t-j\Delta} = \frac{p(t-j\Delta) - p(t-(j+1)\Delta}{p(t-((j+1)\Delta \times 100} \quad (8)$$

p: Market value of stock price; (j): realized fluctuation jump component; (c): realized fluctuation continuity component which the continuous components and significant jumps are detected using equations (9) and (10):

$$j^a_{t,t+1} = I\left(z_{t,t+1} > \varnothing_a\right)(RV_{t,t+1} - BPV_{t,t+1}) \quad (9)$$

$$C^a_{t,t+1} = I\left(z_{t,t+1} \leq \varnothing_a\right)RV_{t,t+1} + I\left(z_{t,t+1} > \varnothing_a\right)BPV_{t,t+1}) \quad (10)$$

Where according to the model (11) we have:

$$z_{t,t+1} = \sqrt{M}\frac{(RV_{t,t+1} - BPV_{t,t+1})/RV_{t,t+1}}{\sqrt{(\mu_1^{-4} + 2\mu_1^{-2} - 5)\max\,(1, \frac{TQ_{t,t+1}}{BPV^2_{t,t+1}}}} \quad (11)$$

IA(X) : is a zero function and one by the following mode:

$$I_A(X) = \begin{cases} 1, X\epsilon A \\ 0, X \notin A \end{cases}$$

Zt,t+1: is used to detect a jump; in this equation, α is the confidence level and critical value, which is calculated based on the standard Gaussian distribution N (0,1). At the confidence level a = 0.999, the value is equal to 3.09. Therefore, if Zt,t+1>3.09, a raid has happened and more number of jumps is detected by decreasing the confidence level; M: indicates the number of time returns; BPV i,t is obtained from the sum of the multiplications of each return in its previous return and as modified in models (12) to (15), [16].

$$BPV^M_{t,t+1} = \mu_1^{-2}\sum i_2^m \left|R^M_{t,i}\right|\left|R^M_{t,i-1}\right| \quad (12)$$

$$R^M_{t,i} = r_{t-j\Delta} \quad (13)$$

$$\mu_a = E(|Z|)Z \rightarrow N(0,1), a > E(|Z|) = \sqrt{\frac{2}{\pi}} \tag{14}$$

$$TQ_t^M = M\mu_{\frac{4}{3}}^{-3}\left(\sum J = 3^M \left|R_{t,i}^M\right|\left|R_{t,i-1}^M\right|\left|R_{t,i-2}^M\right|^{4/3}\right. \tag{15}$$

The independent variable of the research is also presented as follow:

A. Tendency of stocks to deal with price volatility (NPLHi,t): the number of trading months in which the company's stock price deals with the permissible thresholds of price fluctuation. In this study, final price data, minimum and maximum transaction prices have been used. In which if the final price is equal to the highest transaction price or the lowest transaction price, therefore the stock price has dealt with its price fluctuation limit.

Research control variables are also presented as follows:

A- Realized fluctuation of stock returns: the standard deviation of stock returns in current year is measurable.

B- Realized fluctuation of stock returns : The standard deviation of last year's monthly returns, which is calculated through model (16):

$$RV_t^{m-1} = \sqrt{\frac{\sum(r_{\imath m-1} - \overline{r_{\imath m-1}})^2}{n-1}} \tag{16}$$

: last year's monthly return; : last month's average monthly returns; n: number of months.

C- Realized stock returns fluctuation (): the standard deviation of the monthly returns of the current year is calculated through model (17):

$$RV_t^m = \sqrt{\frac{\sum(r_{\imath m} - \overline{r_{\imath m}})^2}{n-1}} \tag{17}$$

: last month's monthly return; : average monthly returns of last year.

D- Financial leverage (Lev i,t): is equal to the minimum value between return (rt) and the number zero, which is calculated through model (18):

$$Lev_{i,t} = \min\,(r_t, 0) \tag{18}$$

Vol i,t: The average logarithm of the company's turnover

SJV i,t: Jump instability calculated through model (19):

$$SJV = RS^+ - RS^- \rightarrow \sum_{0\le s\le t} \Delta p_s^2\, I_{[\Delta PS_{>0}]} - \sum_{0\le s\le t} \Delta p_s^2\, I_{[\Delta PS_{<0}]} \tag{19}$$

p Δ: are Changes in market value of stock prices

I A (X) is a zero and one function with the opposite state which is presented in (20)

$$I_A(X) = \begin{cases} 1; X \in A \\ 0; X \notin A \end{cases}$$

5 Findings and Data Analysis

5.1 Descriptive Statistics of Research Variables

Before testing the hypotheses, the variables are summarized in Table 2.

Table 2 Descriptive statistics of variables examined by companies

turnover	Financial leverage	Realized fluctuation of monthly returns of current year	Realized fluctuation of last year's monthly returns	Current period fluctuation	The number of trading days in which the company's stock price is within the permissible price fluctuation thresholds	Fluctuations in stock returns (stock risk) in the future period	The title of the descriptive variables of index
VOLit	Levit	RVtm	RVtm-1	RVit	NPLH	RVit+1	
5.559607	-0.007452	0.107931	0.076810	0.066335	4.807738	0.056959	average
5.350000	0.000000	0.090000	0.060000	0.039585	5.000000	0.057330	median
10.69000	0.000000	0.860000	0.860000	1.541560	8.000000	0.103660	Max.
1.370000	-0.860000	0.010000	0.010000	0.011210	2.000000	0.016500	Min.
1.657184	0.048662	0.070806	0.056099	0.151570	1.089475	0.015704	Standard deviation
0.535354	-12.06623	2.872957	4.087527	8.076362	0.306102	0.064361	skewness
2.888692	171.2747	18.68047	38.36620	75.85719	2.993842	2.747449	kurtosis
1680	1680	1680	1680	1680	1680	1680	observations

Resource: (researcher's findings)

Table 3: Levin, Lin and Chu Unit Root Test Results

significance	Levin, Lin and Chu statistics	variables
0.0000	-29.7098	stock returns fluctuation in the next period
0.0000	-29.5935	The number of trading days in which the stock price is within the permissible price fluctuation thresholds
0.0000	-4.20983	stock returns fluctuation in the current period
0.0000	-27.3958	Realized monthly stock returns fluctuation over the past year
0.0000	-27.0287	Realized fluctuations in monthly stock returns during the current year
0.0000	-16.4787	Financial leverage
0.0000	-20.0362	turnover

Resource: (Researcher's findings)

In Table 2, the average, which indicates the equilibrium point and gravity center of the distribution and is a good index to show the centrality of the data, for the stock return fluctuation variable (stock risk) in the future period is equal to 0.056. The median is another central index that shows that half of the data is less than this value and the other half is more than this value. Also, the equality of the average and median values indicates the normality of this variable, which for the stock returns fluctuation variable in the future period is equal to 0.057. Dispersion indices are a measure of the extent to which data are dispersed from each other or dispersed amount to the average. Standard deviation is one of the most important dispersion indices which is equal to 0.0157 for the stock return fluctuation variable in the future period. The degree of asymmetry of the frequency curve is called skewness, in which the value of the skewness coefficient for the stock return fluctuation variable (stock risk) in the future is positive and close to zero, which indicates that the distribution is normal and very low skew to the right. Dispersion index of the amount of kurtosis or inclination of the frequency curve compared to the standard normal curve is called protrusion or kurtosis, which in this study, kurtosis is positive for all variables.

5.2 The Reliability Test of Research Variables

The results of the Levin and Lane unit root test are presented in Table 3. In Table 3, the significance level in all variables is less than 0.05 and shows that they are of the order of zero and in the stable level and the mean and variance of variables over time and covariance of variables during 2005-2018 was constant and indicates the reliability of the variables.

5.3 The Correlation Results Test of the Research Model

The results of Pearson correlation coefficient test are presented in Table 4.

Table 4: Correlation Results of the Research Model

VOL	LEV	RV_t^m	RV_t^{m-1}	RV_{it}	NPLH	RV_{it+1}	
						1	RV_{it+1}
					1	0.069856	NPLH
				1	0.072156	-0.176519	RV_{it}
			1	0.248690	0.232315	-0.191861	RV_t^{m-1}
		1	0.470962	0.008188	0.231593	0.166422	RV_t^m
	1	0.030682	-0.124042	-0.316188	-0.006483	-0.067399	LEV
1	-0.034944	0.047687	0.093432	0.101868	-0.035207	-0.090245	VOL

Resource: (researcher’s findings)

According to the results of Table 4, if the correlation coefficient is less than 0.75, there is no correlation between the independent variables.

5.4 Summary of Research Hypothesis Analysis

5.4.1 The First Main Hypothesis of the Research

The results of the first main hypothesis of the research are as described in Table 5. In Table 5, the probability of t-statistic for the fixed coefficient and the coefficients of the variables of the number of trading days in which the company's stock price is within the permissible price fluctuation thresholds, the realized monthly stock return fluctuation during the last year, the realized monthly stock return fluctuation during the current year and the turnover on the return fluctuation is less than 5%; therefore, the above relationship is statistically significant. The coefficient of the number of trading days in which the company's stock price is within the permissible thresholds of price fluctuation is positive and significant.

Stock returns fluctuation (stock risk) in the current period and financial leverage on returns fluctuation are more than 5%; therefore, the above relationship is not statistically significant; therefore, with 95% confidence, these variables are non-significant in the model, and because the variable of the number of trading days when the company's stock price is within the permissible thresholds of price fluctuation on the returns fluctuation is positive and significant, so the hypothesis H0 is rejected; That is, there is a relationship between the number of times each share deals with the price fluctuations and the returns fluctuation.

Table 5: Summary of The Results of the First Hypothesis

significance	statistic -t	Standard error	coefficients	variables
0.0000	106.9285	0.000533	0.056970	y-intercept
0.0000	12.28766	1.37E-05	0.000168	Trading days of dealing with permissible price fluctuation thresholds
0.8879	-0.140960	0.007912	-0.001115	stock returns fluctuation (stock risk) in the current period
0.0000	-19.93393	0.000678	-0.013508	Realized monthly stock returns fluctuation over the past year
0.0000	16.65350	0.000525	0.008747	Realized monthly stock returns fluctuation during the current year
0.1618	-1.399711	0.000580	-0.000812	Financial leverage
0.0000	-13.96946	8.48E-06	-0.000118	turnover
247.8445	F-statistic	0.852235		Determination coefficient
0.000000	significance	0.840349		Adjusted determination coefficient
2.059677		Durbin-Watson		

Resource: (Researcher's Findings)

5.4.2 The Second Main Hypothesis of the Research

The results of the second main hypothesis of the research are as described in Table 6. In Table 6, the probability of t-statistic for the fixed coefficient and the number of times the stock price deals with the high and low price fluctuation threshold, the realized monthly stock return fluctuation during the last year, the realized monthly stock return fluctuation during the current year on the return fluctuation is less than 5%; therefore, the above relationship is statistically significant. The coefficient of the number of times the stock price deals with the high and low price fluctuation threshold on returns fluctuation is negative, positive and significant, respectively. Stock returns fluctuation in the current period and jump instability on returns fluctuation are more than 5%; therefore, the above relationship is not statistically significant.

According to the hypothesis, because the variables of the number of times the stock price deals with the high and low price fluctuations threshold, on the returns fluctuation are negative, positive and significant, respectively. So the H0 is rejected; That is, there is a relationship between the number of times each stock deals with the high and down price fluctuation threshold and the returns fluctuation.

Table 6: Summary of The Results of the Second Hypothesis

Significance level	statistic -t	Standard error	coefficients	variables
0.0000	54.52994	0.001056	0.057594	y-intercept
0.0330	-2.183760	0.000234	-0.000511	The number of times the stock price deals with the high price fluctuation threshold
0.0420	2.048780	0.000123	0.000252	The number of times the stock price deals with the low price fluctuation threshold
0.8439	-0.196981	0.008905	-0.001754	stock returns fluctuations (stock risk) in the current period
0.0043	-2.858237	0.006748	-0.019286	Realized monthly stock returns fluctuations over the past year
0.0184	2.359914	0.005189	0.012245	Realized monthly stock returns fluctuations during the current year
0.6473	-0.457669	3.74E-05	-1.71E-05	Jump instability
225.4603	F-statistic	0.887741		Determination coefficient
0.000000	Significance level	0.878711		Adjusted determination coefficient
2.054966		Durbin-Watson		

Resource: (researcher's findings)

Table 7: Comparison Test of Variances of Two-Society Ratios of Hypothesis 3-1

Significance level	Tukey test	Significance level	F-statistic	Siegel-Tukey rating average	Standard deviation	observations	variables
0.0266	2.217434	0.0000	4.055467	174.3424	0.148947	240	Fluctuation limit 2
				198.2890	0.048574	124	Fluctuation limit 5

Resource: (researcher's findings)

5.4.2 The Third Main Hypothesis of the Research

The results of Hypothesis 3-1 of the research are as described in Table 7. In Table (6), the standard deviation of stock return fluctuation based on jump and continuity components for the 2% fluctuation limit equals to 0.148 and the standard deviation of stock return fluctuation based on jump and continuity components for the 5% fluctuation limit equals to 0.048 ($\delta1 < \delta2$) and the significance level of F test and Tukey test is less than 5%, so the above relationship is statistically significant; That is, stock fluctuation based on jump and continuity components for the 5% fluctuation limit is less than stock return fluctuation based on jump and continuity components for the 2% fluctuation limit.

Also, the rating average of Siegel-Tukey of the stock return fluctuation based on jump and continuity components for the 2% fluctuation limit equals to 174.34 and the stock return fluctuation based on jump and continuity components, for the 5% fluctuation limit equals to 198.28, which shows that the stock returns fluctuation rating average based on the jump and continuity components for the 2% fluctuation limit is less than 5%, so the H0 is rejected, i.e. the change in the fluctuation limit basis from 5% to 2% has reduced the stock returns fluctuation based on price jump and continuity. The results of Hypothesis 2-3 of the research are as described in Table 8:

Table 8: Comparison Test of Variances of Two-Society Ratios of Hypothesis 2-3

significance	Tukey test	significance	-statisticF	Siegel-Tukey rating average	Standard deviation	observations	variables
0.0266	2.217434	0.0000	4.055467	171.8979	0.148947	240	fluctuation limit 2
				197.7042	0.073962	120	Fluctuation limit 3

Resource: (researcher's findings)

In Table 8, the standard deviation of stock return fluctuation based on jump and continuity components for the 2%fluctuation limit equals to 0.148 and the standard deviation of stock return fluctuation based on jump and continuity components for the 3% fluctuation limit equals to 0.073 ($\delta 1 > \delta 2$) and the significance level of F test and Tukey test is less than 5%, so the above relationship is statistically significant; That is, stock fluctuation based on jump and continuity components for the 3% fluctuation limit is less than stock return fluctuation based on jump and continuity components for the 2% fluctuation limit.

The rating average of Siegel-Tukey of the stock return fluctuation based on jump and continuity components for the 2% fluctuation limit equals to 171.89 and the stock return fluctuation based on jump and continuity components, for the 3% fluctuation limit equals to 197.7, which shows that the stock returns fluctuation rating average based on the jump and continuity components has increased from 2%fluctuation limit to 3%, so the H0 is rejected, i.e. the change in the fluctuation limit basis from 2% to 3% has increased the stock returns fluctuation based on price jump and continuity. The results of Hypothesis 3-3 of the research are described in Table 9:

Table 9: Comparison Test of Variances of Two-Society Ratios of Hypothesis 3-3

Significance level	Tukey test	significance	-statisticF	Siegel-Tukey rating average	Standard deviation	observations	variables
0.0134	2.473164	0.0000	7.195257	109.4125	0.198397	120	Fluctuation limit 3
				131.5875	0.073962	120	Fluctuation limit 3.5

Resource: (researcher's findings)

In Table 9, the standard deviation of stock return fluctuation based on jump and continuity components for the 3% fluctuation limit equals to 0.198 and the standard deviation of stock return fluctuation based on jump and continuity components for the 3.5% fluctuation limit equals to 0.073 ($\delta 1 > \delta 2$) and the significance level of F test and Tukey test is less than 5%, so the above relationship is statistically significant; That is, stock fluctuation based on jump and continuity components for the 3.5% fluctuation limit is less than stock return fluctuation based on jump and continuity components for the 3% fluctuation limit.

Also, the rating average of Siegel-Tukey of the stock return fluctuation based on jump and continuity components for the 3% fluctuation limit equals to 109.41 and the stock return fluctuation based on jump and continuity components, for the 3.5% fluctuation limit equals to 131.58, which shows that the stock returns fluctuation rating average based on the jump and continuity components has increased from 3%fluctuation limit to 3.5%, so the H0 is rejected, i.e. the change in the fluctuation limit basis from 3% to 3.5% has increased the stock returns fluctuation based on price jump and continuity. The results of Hypothesis 4-3 of the research are described in Table 10:

Table 10: Comparison Test of Variances of Two-Society Ratios of Hypothesis 4-3

Significance level	Tukey test	significance	-statisticF	Siegel-Tukey rating average	Standard deviation	observations	variables
0.4445	0.764594	0.6023	1.067888	601.0507	0.191987	1076	Fluctuation limit 4
				575.6292	0.198397	120	Fluctuation limit 3.5

Resource: (researcher's findings)

In Table 10, the standard deviation of stock return fluctuation based on jump and continuity components for the 4% fluctuation limit equals to 0.191 and the standard deviation of stock return fluctuation based on jump and continuity components for the 3.5% fluctuation limit equals to 0.198 ($\delta 1 \leq \delta 2$) and the significance level of F test and Tukey test is less than 5%, so the above relationship is not statistically significant; so the H0 is confirmed, and the change in the fluctuation limit basis from 3.5% to 4% has not increased the stock returns fluctuation based on price jump and continuity. The results of Hypothesis 5-3 of the research are described in Table 11.

Table 11: Comparison Test of Variances of Two-Society Ratios of Hypothesis 5-3

Significance level	Tukey test	significance	-statisticF	Siegel-Tukey rating average	Standard deviation	observations	variables
0.0139	2.460280	0.0000	15.62165	592.1441	0.191987	1076	Fluctuation limit 4
				673.0078	0.048574	124	Fluctuation limit 5

Resource: (researcher's findings)

In Table 11, the standard deviation of stock return fluctuation based on jump and continuity components for the 4% fluctuation limit equals to 0.19 and the standard deviation of stock return fluctuation based on jump and continuity components for the 3% fluctuation limit equals to 0.048 ($\delta 1 > \delta 2$) and the significance level of F test and Tukey test is less than 5%, so the above relationship is statistically significant; That is, stock fluctuation based on jump and continuity components for the 4% fluctuation limit is less than stock return fluctuation based on jump and continuity components for the 5% fluctuation limit. Also, the rating average of Siegel-Tukey of the stock return fluctuation based on jump and continuity components for the 4% fluctuation limit equals to 592.14 and the stock return fluctuation based on jump and continuity components, for the 3% fluctuation limit equals to 673.007, which shows that the stock returns fluctuation rating average based on the jump and continuity components has increased from 4%fluctuation limit to 5%, so the H0 is rejected, i.e. the change in the fluctuation limit basis from 4% to 5% has increased the stock returns fluctuation based on price jump and continuity.

6 Discussion and Conclusion

The present study seeks to investigate the effect of stock tendency of stock's deal with fluctuation limit and price fluctuation threshold and change of the fluctuation limit basis in creating returns fluctuations, finally the results showed that according to the first hypothesis, the number of times each stock deals with the price fluctuation has a significant effecton the returns fluctuation, these results are in line with the concepts of delayed price discovery that if the fluctuation range interferes with market trends, then it should be expected that after reaching the stock price to its fluctuation range, its return fluctuation should be reduced and the stock return fluctuation that do not reach to its price fluctuation range should be reduced. In this regard, Shariat Panahi and [1] showed that Tehran Stock Exchange officials have could prevent sharp and over-reactive fluctuations of investors by applying the price fluctuation range. [8] also provided evidences of an irregular overreaction in the Egyptian stock market, which is in line with the results of the present study. According to the second hypothesis, the number of times each stock deals with the high and low price fluctuations threshold has a significant effecton the return fluctuation; these results can be justified in line with the concepts related to hyper-reactive theory, i.e. after the price reaches the fluctuation range, the reverse process occurs, which indicates the occurrence of hyper-reactivity and its correction. Therefore, after the price reaches the allowable range, the fluctuations decrease. Based on this, it can be said that despite the range of fluctuations, investors have the opportunity to re-evaluate important and new news and not to trade unknowingly. In this way, over-reaction will be prevented and emotional and ill-considered reactions in the market will be reduced and consequently fluctuations will be reduced. In this regard, [5] also showed that price limitation can effectively control sharp price movements; which is in line with the results of the present study. According to the third hypothesis; changing the fluctuation limit basis from 5% to 2% has reduced the stock returns fluctuation based on price jump and continuity; In addition, changing the fluctuation limit basis from 2% to 3% has increased the stock returns fluctuation based on price jump and continuity; other results showed that changing the fluctuation limit basis from 3% to 3.5% increased the stock returns fluctuation based on the price jump and continuity, and changing the fluctuation limit basis from 3.5% to 4% also increased the stock returns fluctuation based on price jump and continuity, and finally the results showed that changing the fluctuation limit basis from 4% to 5% has increased stock returns fluctuation based on price jump and continuity. Based on this, it can be said that changing the fluctuation limit basis has changed the stock returns fluctuation based on price jump and continuity. These results are in line with the fluctuation prospective hypothesis; According to this hypothesis, increasing the stock price fluctuation limit will cause more stock price fluctuation in the coming days; these results can also be justified based on magnetic effect hypothesis; in fact, the magnetic effect is closely related to the over-reaction of investors due to applying the price fluctuation limitation range. The magnetic effect can be considered as the opposite of the calming effect of the fluctuation range. Explaining this effect, it is stated that one of the reasons for proving the instability of the fluctuation range is based on this hypothesis that investors believe in the price trend. In this regard, [13] found that price limitations tend to intensify stock market fluctuations; which is in line with the results of the present study. The results of research conducted in different places and times by different people are inevitably affected by different conditions, and the consistency or inconsistency of the results of researches on the same subject cannot ignore these different conditions.

According to the results of the first hypothesis; it is suggested that the allowable fluctuations range be increased so that the effects of new news and information can be immediately reflected in the price and the stock price reaches its intrinsic value more quickly; in addition, considering that increasing the fluctuation range may lead to severe index fluctuations, it is suggested to provide a mechanism for calculating free float stocks and calculating the index based on it so that the index fluctuations are a better indicator of market fluctuations. Also according to the results of the second hypothesis; it is suggested that the professional analysis level in the market be improved by monitoring the activities of consulting companies and awarding professional certifications to analysts. Also, in order to protect investors against severe fluctuations, it is necessary to use risk management tools such as derivatives on the Tehran Stock Exchange. Accordion the results of investigating the third hypothesis, it is suggested to investors to recognize the effect of the change of fluctuation limit basis on geometric Brownian motion along with price jump before investigating in stocks of a company, using fitted model in this research, and consider the results in their decision-makings. It is suggested to the investors to investigate following topics in their next researchers:

Doing research similar to controlling the characteristics of companies such as size, industry, etc. Further investigating of the effects of applying fluctuation range with different methods, due to the small number of domestic studies on the effects of applying the price fluctuation range, the importance of this mechanism in the Stock Exchange market and the lack of coordination between the results of different researches and better understanding of the effects of applying price fluctuations range using the information during trading sessions. The most important limitation of the present study is the lack of full disclosure of information related to research variables. Information on all research variables is not fully available for listed companies. Therefore, to avoid biasing the research results, some company-years were removed from the statistical sample and this reduced the sample size.

References

[1] Akhgar, MO., Mirzaei, B., Investigating the relationship between company life cycle and specific fluctuations in stock returns with emphasis on fundamental uncertainty and information uncertainty, *Financial Accounting Quarterly,* 2019; **11**(42):100-129. Doi:1911-3846.1997.tb00537.x

[2] Basti Rad, M.R., Yazdani, Sh., Relationship between liquidity, financial leverage, sales growth and cost price with price fluctuations and stock returns in companies listed on the Tehran Stock Exchange, *Accounting and Management Perspectives,* 2020; **3**(22):142-153.

[3] Berkman, H., Lee, J., The effectiveness of price limits in an emerging market: Evidence from the Korean Stock Exchange, *Pacific-Basin Finance Journal,* 2002; **10**(7): 517-530. doi:10.1016/S0927-538X (02)00040-9.

[4] Chen, Y.M., Price limits and stock market volatility, *Pacific Basin Finance Journal*, 2018, **1**(1), P.139–153. doi:10.1016/S0165-1765(00)00403-1.

[5] Chu Shan, Y., Lin, Y., The stabilizing effects of price limits: New evidence from jump contributed price variations, *The North American Journal of Economics and Finance*, 2018; **4**(18). doi: 10.1016/j.najef.2018.07.012.

[6] Dehghan Benaraki, Sh., Amini, Eh, The Role of Emotional Behaviors in Stock Price Fluctuations of Tehran Stock Exchange, *Business Management Quarterly*, 2020; **12**(45): doi:10.22051/JFM.2016.2483

[7] Fallah Shams, M. F., Eskandari, M., Investigating the role of asymmetry on the effect of abduction on stock price fluctuations, *financial engineering and securities management*, 2018; **9**(34): P.233-248.

[8] Farag, H., The influence of price limits on overreaction in emerging markets: Evidence from the Egyptian stock market, *The Quarterly Review of Economics and Finance*, Elsevier, 2015; **58**(3): P.117-158,190-199. doi: 10.1016/j.qref.2015. 01.003.

[9] Islami Bidgoli, Gh., Alishvandi, Ab, Investigating the effects of changing stock price fluctuations on market fluctuations, market returns, number of trades, *trading volume and stock rotation speed in Tehran Stock Exchange*, Financial Research, 2009, **11**(27).

[10] Kashanipour, M., Yousefi.Manesh, D., *Investigating the effect of changing the rate of stock price volatility on stock returns and trading volume of companies listed on the Tehran Stock Exchange*, Accounting Knowledge, 2012; **4**(12): doi:10.22103/jak.2013.523

[11] Kim, W., Sungjae, J., Effects of a Price Limit Change on Market Stability at the Intraday Horizon in the Korean Stock Market, *Economics Letters*. 2018; **3**(14): doi:10.1080/13504851. 2018.1488043.

[12] Kim, Y.H., Joes, Y., Relative performance of trading halts and price limit: Evidence from the Spanish Stock Exchange, *International Review of Economics and Finance*, 2008, **17**(1), P.197-215. doi: 10.1016/j.iref.2007.06.003.

[13] Lin, Ch., Kuan-Cheng, K., Hsiang-Hui, Ch., Information discreteness, price limits and earnings momentum, *Pacific-Basin Finance*, 2016; **37**(2): P.1–22. doi: 10.1016/j.pacfin.2016.02. 003.

[14] Monjzeb, M.R., Ali Mohammadi, M., *Permissible range of fluctuations in Tehran Stock Exchange: its effects, dimensions and analysis*, Quarterly Journal of Financial and Economic Policies, 2015, **2**(7), P. 72-57. (in Persian). http://qjfep.ir/article1-210.fa.html

[15] Nasr, N., Farhadi Sartangi, M., Madahi, Z., A Fuzzy Random Walk Technique to Forecasting Volatility of Iran Stock Exchange Index, *Advances in Mathematical Finance and Applications*, 2019, **4**(1), P. 15-30. doi:10.22034/AMFA.2019 .583911.1172.

[16] Osman, U., Lawrence, K., Volatility spillover around price limits in an emerging market, *Finance Research Letters Available*, 2020; **30**(5): doi:101610. 10.1016/j.frl.2020. 101610.

[17] Rezaei, N., Elmi, Z., Behavioral finance models and behavioral biases in stock price forecasting. *Advances in mathematical finance and applications*, 2018; **3**(4): P.67-82. doi:10.22034/ AMFA.2019.576127.1118.

[18] Shafiee, S., Hadi.M., Investigating the effects of stock price fluctuations on the Iranian Stock Exchange, *the first international conference on new horizons in the humanities, Tehran: New Horizons Science and Technology Association*, 2016; **16**(1): (in Persian). doi:20160510143337-9856-146

[19] Shariat Panahi, S., Abjadpour, A., The Effect of Daily Price Fluctuation on the Price Behavior of Shares and Investors with Reverse Investment Strategy Approach, *Empirical Studies in Financial Accounting*, 2011; **9**(36):93-121. (in Persian). doi:10.15066653/car.25.1.9

[20] Sharifi, A., Exploration in the range of stock price fluctuations, *World of Economics*, No. 4499,2011.

[21] Wan, Y., Gang, J., The cooling-off effect of price limits in the Chinese stock markets, *Trading and Market Microstructure*. doi: 10.1016/j.physa.2018.03.066,2018.

[22] Wong, K., Kong, X., The Magnet Effect of Circuit Breakers and Its Interactions with Price Limits, *SSRN Electronic Journal*, 2016; **3**(14): doi:10.2139/ssrn.2897328.

[23] Zarei, B., Moradi, A., Study of the Impact of EPS and the limit of stock price fluctuations on the volume of transactions in the Iranian capital market, *2nd International Conference on Futurology, Management and Economic Development, Mashhad, Torbat Heydari University*, 2015; **6**(7):128-153.

[24] JI, S. H., YOON, K., The Effects of Widening Daily Stock Price Limits on the Relevance between Audit Quality and Stock Return, *The Journal of Asian Finance, Economics, and Business*, 2020; **7**(4):107-119. doi:10.15722/JDS.17.9.201909.103

[25] Liu, J., Huang, Y., Chang, C. P., Leverage analysis of carbon market price fluctuation in China, *Journal of Cleaner Production*, 2020; **9**(8); 245, 118557. doi:10.1016/j .jclepro.2019.118557

[26] Liu, C., Wang, C., Financial stability and real estate price fluctuation in China, *Physica A: Statistical Mechanics and its Applications*, 2020; 3(1): P.540, 122980. doi: 10.1016/j.physa.2019.122980