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Identification the Periods of Formation and Bursting of Speculative Bubbles in Iranian Stock Market Using Quantitative Models

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ABSTRACT

The purpose of this study is to investigate and identify the periods of formation and bursting of speculative bubbles in Iran's capital market by creating a state space model and two-mode switching regime (mode 1 is bubble growth and burst stage and mode 2 is the time of bubble loss) during the period from April 2011 to March 2018. The Oxmetrics 7 software is used to investigate the existence of multiple bubbles and research objective. The results of the study of the state space switches confirm the bubble of the capital market in Iran during four periods in the research domain. The life span of the first speculative bubble is 2 months from October to November 2011, the second is 8 months from March to October 2013, the third is 3 months from December 2015 to February 2016, and the fourth period of bubble is 5 months from August to December 2017. Therefore, the result of the research stipulates that the stock index of the Iranian capital market in the realm of research time period has had 18 months of bubbles and has spent 66 months in balance.

1 Introduction

Stock market crises are one of the most important events in the field of science and practice, which is a source of stress and anxiety for investors and businessmen. Despite the efforts of experts to justify the fluctuations and changes in stock market prices by economic variables, research has shown that prices have risen irrationally before the crisis occurred in the financial markets. It is such that none of the pricing models and economics variables can justify the growth of prices [1]. The speculative bubble, on the other hand, is a bubble formed by unrealistic expectations, market sentiment, and so on. In this type of bubble, investor is willing to pay an unrealistic amount to buy a share knowingly or without knowing the true value of the share, and only because he is confident that if he buys the share at any price today, there are other investors who buy that share at a higher price. In this type of bubble, the investor has no estimation of future earnings of the share or ignores these estimations. In this type of bubble, there is no rational backing (except for rumors) for the price increase [2]. Therefore, when faced with irrational price bubbles, the investment is not based on risk and return information, and the market will be driven by random and psychological responses.

After decades of research, financial economists are dissatisfied with how to measure and identify the stock market bubble, especially how to explain and predict the behavior of speculative bubbles, which is also essential for authorities and investors. Since the stock bubbles are invisible, this question has amazed investors for a long time “can bubbles be described in the same way as other countries, such

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as the United States or the Netherlands?" Therefore, the distinction of this research with other empirical studies is that all researchers during the research period only identified and reported the bubble or non-bubble of the stock market, but the identification of the time of bubble formation, its bursting, the equilibrium of the stock market and, eventually, the re-establishment of multiple bubbles over all periods of the research area were not reported. The purpose of this study is to use the Markov space method, which has been used to compute business cycles so far, to identify and report multiple bourgeois bubbles.

2 Theoretical Foundations and Experimental History

Different methods have been used to determine the bubbles by researchers. One of the primary methods for assessing the existence of bubbles in asset prices is Variance Bound Test. In this test, it is stated that assuming rational expectations, the difference between real and expected earnings is not predictable and has a mean of zero, and the variance of prices is naturally bounded and the expected increase in prices with information in the market is unassociated. Therefore, if data passes through the boundary of variance, it can be a sign that the asset price does not follow a fundamental bubble pricing equation. One of the studies that used this method is Shiller [3]. However, due to criticisms, this method is not used in recent studies to consider bubbles [4]. Another method of studying bubbles is West's Two-Step Test in which two series of estimates of required coefficients are compared with each other to calculate the present value of expected dividend flow. This method was later criticized. Among them, Dezbakhsh and Demirguc-Kunt [5] stated that this test had no valid results in samples with very small observations. Wu [6] proposed to calculate the bubble as a deviation from the current value model. Diba and Grossman [7] proposed methods for studying bubbles based on the concept of accumulation, which was used in most internal and external studies, and it was stated that in the absence of a bubble and with a certain degree of stagnation, an explicit accumulation relationship exists between the two profit and price variables, and the existence of a bubble would break this relationship.

One of the most critical criticisms of this approach was introduced by Evans [8]. In his study, he showed that if a non-uniform incremental bubble does not collapse to zero and reaches a value in excess of zero, then it is not possible to detect it by these tests; in other words, these tests can't detect the collapse or bursting of the bubble, as these collapse behave like a mana process more than their behavior is like an explosive process. Therefore, the rejection of the hypothesis of the absence of bubbles in the framework of this method may change some of the components of the current value pattern. In other words, according to Evans [8], the rejection of the null hypothesis (H_0) through this test cannot be a verifiable confirmation of the bubble's lack of necessity in the time series of the observations. Despite the shortcomings mentioned, Hu et al [9] studied the bubble of asset prices in Japan, for a ten-year period and confirmed the presence of bubbles in two stock markets and real estate. Tarlie et al. [10] also studied bubbles and anti-bubbles in the US stock market and, confirmed that the dynamics of stock valuation were temporarily explosive; indicating that the US stock market was a bubble in 2017. Ali et al. [11] by reviewing a five-year period in a sample of 106 companies admitted to Iran during the period from 2011 to 2015, confirmed that the Iranian stock market had a bubble. Ho and Oxelly [12] investigated explosive behavior in British stocks and found signs of explosive behavior on British railways in the 1840s.

Hu and Oxley [13] considered the relative prices of tradable goods as the fundamental exchange rate variables in order to test the rational bubbles in the markets of G10 currencies and the G10 countries by

using generalized Dickey-Fuller's general suppression test. Arabs et al. [14] stated that the price bubble has a positive and significant relationship with non-fundamental stock value, and the risk aversion of the stockholders' behaviour has a positive and significant effect on non-fundamental stock value. Finally, from among the two independent variables, the price bubble has a greater effect on the dependent variable. Balcilar et al. [15], Attribute this to investors who use irrational behaviours in certain parts and endorse the speculative bubble in South Africa. Nneji [16] suggests that liquidity and market shocks may create bubbles in the stock market and market liquidity has a positive effect on the bubble in the stock market. Also, liquidity shock is a warning for the occurrence of bubble in the stock market. Kothari et al. [17] confirmed that an increase in investment was a prediction of negative profit growth and low returns as public investment data, and an increase in investment at the same time is associated with bad news. Data analysis shows that after the 2008 financial crisis, the decline in investment based on GDP and profit reduction at the end of 2008 was abnormal. Other researchers such as Nasser et al. [18], Jokar et al. [19], and Ali et al. [11] studied the stock market situation with Fuzzy, Garch, and Panel data to analyze the capital and stock market index. These reviews are while West considers bubbles as another regime that is definitely different from the static autoregressive process, and considers a statistically significant difference between the two estimators of a particular parameter as a sign of a speculative bubble.
Hall et al. [20] first introduced the Markov switching technique in ADF tests to distinguish discrete regimes (continuity regime and collapse regime) in bubble-time series data. Although this technique has been criticized by Van Norden and Vigfusson for its size, Markov's methodology has been used by more people because of the fact that bubbles often switch between two or more regimes [21]. Zhao and Zeng [22] argued that the monthly trend of output could be divided into two modes of bubble continuity and bubble collapse. Chen et al. [23] reported an engineering method based on state space model with Markov Switching to explain the speculative bubble of stock markets in China and the United States. They concluded that Markov model effectively detects stock market bubbles, captures switching probabilities between regimes of continuity and collapse, and further confirms in-sample and out-of-sample forecasts. Considering the theoretical foundations and research background, Kim and Nelson model [24, 26] that developed the use of state space model under the switching regime in the business cycle has been used in this study. It is intended to consider Al-Anaswah and Wilfling model [18] and Kim & Nelson model [24] in order to monthly identify and examine the multiple speculative bubble in the stock market of Iran during the period from 2011 to 2017 to determine whether the method of Markov switching regime can detect all bubble periods of the realm of research time.

3 Research methodology

The present study is post-hoc through past information based on its characteristics and direction of data. From the point of view of choosing the best method of evaluating the pricing of bubbles, it is a type of applied research and the method used in this research is descriptive. In terms of its nature, it is a kind of correlation analysis and regression. The spatial domain of the research is companies accepted in Tehran Stock Exchange and the time domain is April 2011 to March 2018.

3.1 Research model

Markov Model: In nonlinear models, it is assumed that the behavior of the variable being modelled is different and varies in different situations. Nonlinear models are divided into two main groups in terms of the rate of change from one state to another. In some of these nonlinear models, the change from one state to another is slowly (such as STAR and artificial networks), in some other models, this transition is carried out very quickly, as the Markov-Switching model. Markov-switching models can be classified into different types depending on which part of the autoregressive model is dependent on the regime and is affected by it. The important point in economic studies is the four modes of Markov Switching in mean (MSM), intercept (MSI), autoregressive parameters (MSA), and heteroscedasticity (MSH). Given the fact that some economic variables are of nonlinear behavior based on economic theories and empirical observations, these models can be used to model these variables nonlinearly. In general, various types of Markov Switching Autoregressive models can be explained using a linear autoregressive model [27]. Summary of different modes of MS-AR models is presented in Table 1. Given the fact that some economic variables have nonlinear behavior based on economic theories and empirical observations, it is possible to model these variables by nonlinear models using the models presented in Table 1. Finally, it should be noted that estimating the Markov Switching model is based on methods such as Maximum Likelihood Estimation, Expectation Maximization, and Gibbs Sampling Approach [27].

Table 1: Summary of different models of MS-AR models

Description		MSM		MSI	
		mean variable	mean fitted	Variable origin	Constant origin
A—fitted	σ fitted	MSM-AR	AR	MSI	AR
	σvariabls	MSMH-AR	MSH-AR	MSIH-AR	MSH-AR
A—variabls	σ fitted	MSMA-AR	MSA-AR	MSIA-AR	MSA-AR
	σvariabls	MSMAH-AR	MSAH-AR	MSIAH-AR	MSAH-AR

Given the fact that some economic variables have nonlinear behavior based on economic theories and empirical observations, it is possible to model these variables using nonlinear models presented in the table above. Finally, it should be noted that estimating the Markov switching model is based on methods such as Maximum Likelihood Estimation, Maximum Expectation and Gibbs Sampling [27]. Hall et al. [20] first introduced the Markov switching technique using ADF tests to distinguish discrete regimes (continuity regime and collapse regime) in bubble time series data. Markov's methodology has been used by more people because of the fact that bubbles often switch between two or more regimes.

As discussed in the theoretical literature section, according to Al-Anaswah and Wilfling model [25] and Kim & Nelson model [24] who used the state-space model under the switching regimen, we also identified this bubble as a deviation of the stock index from a fundamental value and this fundamental value is calculated using Campbell and Shiller's [28] model. Assume that we can approximate the stock index (d_t) trend with *ARIMA (k, 1, 0)*:

$$\Delta d_t = \mu + \sum_{j=1}^{k} \varphi_J \Delta d_{i+j} + \delta_t \tag{1}$$

Where d_t represents the actual index of the total stock at time t, and $\delta_t \sim N(0, \sigma_\delta^2)$represents the Gaussian white noise error in which we can estimate the autoregressive order through the available data. According to Diba and Grossman [29] and Yan [30], we assume that B_t represents the rational speculative bubble component and that the bubble process(B_t) is true in the equation of homogeneous difference:

$$B_t = (1/\psi)B_{t-1} + \eta_t \tag{2}$$

Where $\eta_t \sim N(0, \sigma_\eta^2)$ is not correlated to the change in the total stock index δ_t in equation (1). When $1/\psi > 1$ occurs, this bubble grows, and when $1/\psi < 1$ is obtained, this bubble collapses. Consider the following rational expectation model of determining stock price:

$$q = k + mE_t(P_{t+1}) + (1 - \Psi)d_t - P_t \tag{3}$$

Where, q is the required logarithmic gross return, E_t is the mathematical expectation operator that depends on all the information available at time t, P_t is the total stock index at time t, and K and m are the linearization parameters. By applying the pessimistic condition of $\lim_{i\to\infty} m^i E_t(P_{t+i}) = 0$, we can obtain the special answer to this differential equation, which is equal to the intrinsic quantity of $P_t^f = \frac{k-q}{1-m} + (1-m)\sum_{i=0}^{\infty} m^i E_t(d_{t+i})$, the answer of which is $P_t = P_t^f + B_t$. By sorting out these equations, we can easily reach:

$$\Delta P_t = \Delta P_t^f + \Delta B_t = (1-m)\sum_{i=0}^{\infty} m^i \left[E_t(d_{1+i}) - E_{t-1}(d_{t+i-1})\right] + \Delta B_t \tag{4}$$

Since the bubble component is invisible, we cannot directly estimate the model from this equation. Therefore, these equations should be placed in the form of a state space so that Kalman filtering technique can be used to deal with this problem. In order to use the Kalman filter to estimate the invisible bubble, this theoretical model is expanded and ultimately the final model in the state space mode is expressed as follows:

$$\beta_t = (\beta_t, \beta_{t-1})', z_t = (\Delta d_t, \Delta p_t)', g_t = (1, \Delta d_t, \Delta d_{t-1}, \Delta d_{t-2}, \dots, \Delta d_{t-n})' \tag{5}$$

$$£_t = (\eta_t, 0)', \eta_t = (\delta_t, 0)' \tag{6}$$

$$\boldsymbol{F} = \begin{pmatrix} 1/\Psi & 0 \\ 1 & 0 \end{pmatrix}, H = \begin{pmatrix} 0 & 0 \\ 1 & -1 \end{pmatrix} \tag{7}$$

$$D = \begin{pmatrix} \mu & 0 & \emptyset_1 & \emptyset_2 & \cdots & \emptyset_{h-1} & \emptyset_h \\ 0 & (1-m) & (1-m)m & (1-m)m^2 & \cdots & (1-m)m^{h-1} & (1-m)m^h \end{pmatrix} \tag{8}$$

$$\boldsymbol{\Omega} = \begin{pmatrix} \delta_\eta^2 & 0 \\ 0 & 0 \end{pmatrix}, \boldsymbol{R} = \begin{pmatrix} \delta_\delta^2 & 0 \\ 0 & 0 \end{pmatrix} \tag{9}$$

To identify the state space, this bubble must switch between alternative regimes, the regime in which the bubble continues and the regime in which the bubble collapses. Introducing the first-order Markov process with transition probabilities of $P_{ij} = pr[S_t = j/S_{t-1} = i]$ and the transition probability matrix of $\mathbf{\Pi} = \begin{pmatrix} p_{11} & 1-p_{22} \\ 1-p_{11} & p_{22} \end{pmatrix}$, the state space model can be reviewed taking into account the related approximation algorithm and approach in Kim and Nelson and the introduction of the Kalman filter model as follows [25].

$$P_{i\,|t}^{(i,j)} = [I - P_{i\,|t-1}^{(i,j)} H_j' [f_{t\,|t-1}^{(i,j)}]^{-1} H_J] P_{t\,|t-1}^{(i,j)} \tag{10}$$

$$\beta_{t\,|t}^{j} = \frac{\sum_{i=1}^{2} Pr[S_{t-1}=i, S_t=j\,|\Psi_t]\beta_{t\,|t}^{i,j}}{Pr[S_t=j\,|\Psi_t]} \tag{11}$$

$$\beta^{j}_{t\,|t} = \frac{\sum_{i=1}^{2} Pr[S_{t-1}=i, S_t=j\ |\Psi_t]\{\beta^{i,j}_{t\,|t} + (\beta^{j}_{t\,|t} - \beta^{(i,j)}_{t\,|t})\left(\beta^{j}_{t\,|t} - \beta^{(i,j)}_{t\,|t}\right)'\}}{Pr[S_t = j\ |\Psi_t]} \quad (12)$$

Where $\beta^{i,j}_{t\,|t-1} = E[\beta_t\ |\Psi_{t-1}, S_t = j, S_{t-1} = i]$ and $\beta^{i,j}_{t\,|t-1} = E[(\beta_t - \beta_{t\,|t-1})(\beta_t - \beta_{t\,|t-1})^{/}\ |\Psi_{t-1}, S_t = j, S_{t-1} = i]$ Ψ_{t-1} represents the vector of observations observed at time t-1, $\beta^{i}_{t-1\,|r-1}$ is an inference from β_{t-1} based on the information up to time t-1 with respect to $S_{t-1} = i$, $\beta^{(i,j)}_{t\,|r-1}$ is an inference from β_t based on the information up to time t-1 with respect to $S_{t-1} = i$, $\zeta^{(i,j)}_{t\,|t-1}$ is the conditional prediction error of z_t based on the information up to time t-1 with respect to $S_t = j$, $S_{t-1} = i$, and $f^{(i,j)}_{t\,|t-1}$ is conditional variance of the prediction error $\zeta^{(i,j)}_{t\,|t-1}$. So, in order to reduce the complexity of the models, we use the $\frac{1}{\Psi}$ autoregressive coefficient between two switching modes, and leave all other parameters between non-switching Markov regimes. Finally, we can get $1/\Psi_1$ and $1/\Psi_2$ from the matrix F_{st}. If we have $1/\Psi_1 \neq 1/\Psi_2 \neq 0$, we can say that we have succeeded in differentiating the phases of continuity and collapse from the bubble process [23].

The variable used in this research is the total price index of Tehran Stock Exchange during the period from 2011 to 2018 and on a monthly basis. The total price index is one of the main indicators of Tehran Stock Exchange, which is based on the Laspeyres formula. This indicator is internationally known as TEPIX and is the most important measure of Tehran Stock Exchange performance and measurement of price fluctuations. This index is used as the research variable due to features such as being weighted, availability and comprehensiveness, and since it has not been affected in the face of changes such as companies' entering and leaving, increasing the company's capital from cash receipts and merging companies.

$$TEPIX = \frac{\sum_{i=1}^{n} P_{it} q_{it}}{D_t} \times 100 \quad (13)$$

Where, P_{it} is the price of company i at time t, q_{it} is the number of published shares of company i qat time t, D_t is the base number at time t that was $\sum p_i q_i$ at the origin, and n is the number of companies that are indexed.

4 Research findings

4.1 Descriptive Statistics

First, a review of the statistical status of the variable will be considered in the research. The statistical information of the total stock index is presented in Table 2 and Fig. 1.

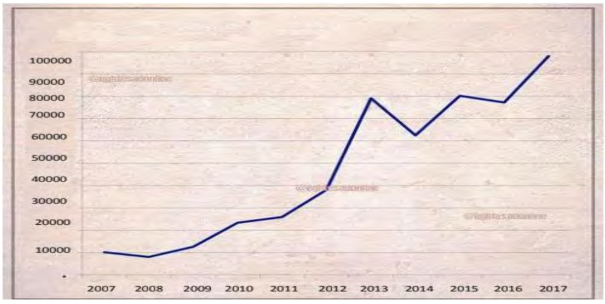

Fig. 1: Growth of the total stock index

Table 2: Descriptive statistics of data

te	Description
60738.79	Mean
67330.35	Median
98817.28	Maximum
24279.10	Minimum
23147.97	Std. Dev.
7.958043	Jarque-Bera
0.018704	Probability

source: Researcher calculations

The total stock index is calculated on the basis of changes in the shares of the companies accepted in the stock exchange. Therefore, it has a comprehensive characterization and is easily available that is studied as the main and fundamental variable of this research on a monthly basis from 2011 to 2018. According to the descriptive statistics table 1, the average total stock index in the Iranian stock market was 6.738.79 and the highest index in January 2018 was 98817.28. The total stock index over the 7 years of the research period was August 2012, which is reduced to 24279.10.

4.2 Stationary Test

The first step in specifying and estimating the research model is to identify variable's stationary state. For this reason, the augmented Dickey Fuller unit root test is used as DF and Phillips-Perron (PP) is used separately. To do this, the above test is first performed on each of the variables. If the absolute value of the DF and PP statistics is less than the absolute value of critical values at a significant level of 5% and 1%, then it is accepted that the time series is non-stationary at the data level. We then differentiate them once and run the Dickey Fuller test or Phillips Perron on the data difference to conclude that whether the variables become stationary with just a single-time differentiation or not. If the absolute value of the DF or PP statistics is computed for a single-time differentiated series is greater than the absolute value of critical values at significant levels of 5% and 1%, then it is assumed that the series is stationary and is a series summing up class I (I). The results of this test are presented in Table 3.

Table 3: Augmented Dickey-Fuller and Phillips-Perron tests for total stock index

Stationarity Test					
Test critical values		t stat First difference	t stat the data level	test	
5%	1%				
-1.94	-2.59	-6.17	-0.21	Constant	DF-GLS test statistic
-3.08	-3.64	-6.39	-1.91	Constant, Linear Trend	
-2.89	-3.51	-6.42	-0.77	Constant	Phillips-Perron test statistic
-3.46	-4.07	-6.38	-1.78	Constant, Linear Trend	

source: Researcher calculations

As the stationary test showed, the absolute value of Dickey-Fuller and Phillips-Perron statistics of the research variable at the data level is smaller than the absolute value of critical values even at the 1% error rate. In other words, the variable is not stationary even at the error level of 5%. Therefore, the first-order differentiation of variable is performed and the results showed that both the trend and the non-trend in both tests, the absolute value of the statistics is greater than the absolute value of the critical values at the 1% error level in the first difference. Therefore, the above variable is stationary in the first differentiation.

4.3 Model Testing

This research seeks to investigate the speculative bubbles in the capital market of Iran with the state space model and Markov Switching during the period from 2011 to 2018 as monthly data. For this purpose, the bubble is modelled as an latent variable by adding two different regimes so that the first regime is equivalent to the time of the formation of the bubble, that is, when the price of the stock changes on the basis of factors other than the fundamental factors, and the second regime equals the time of bubble collapse, i.e. stock prices are determined on the basis of fundamental factors. In the state space Markov technique, it is allowed to switch the duration of the bubble formation between the two switched regimes, and in addition to the stock bubble, its lifetime is also recognized. The estimated model is a MSAH model, in which both regression coefficients and the covariance of error terms are a function of the latent variable of the regime. Of course, since regression coefficients and covariance of error terms are different in regimes, the research model does not allow the use of other Markov models.

Table 4: Research model test results

Modelling MS_ARMA(2, 1, 0)				
t-prob	t-value	Std.Error	Coefficient	Description
0.000	7.63	0.0141	0.107768	AR(1)
0.001	3.47	1105	3833.36	regime 1
0.675	-.421	717.5	-302.343	regime 2

	Regime 0,t	Regime 1,t
Regime 0,t+1	0.75628	0.066159
Regime 1,t+1	0.24372	0.93384

	Coefficient	Std.Error
sigma	2628.26	249.9
p_{0|0}	0.756284	0.1725
p_{1|1}	0.933841	0.05353

log-likelihood -781.725096 Linearity LR-test Chi^2(3) = 12.484 [0.0059]** approximate upperbound: [0.0262]*

The LR statistic is used to determine suitability of a non-linear model against a linear model. The results showed that the estimated nonlinear model is superior to the linear model. In the above estimated model, number 2 represents the number of regimes, number 1 represents the number of autoregressive lags, and number 0 represents the number of moving average lags. Based on the estimated results, the value of the dependent coefficient AR (1) is equal to .107, the standard deviation of the coefficient is also .0141, the t-statistic is 7.63, and its probability is estimated to be .000, indicating the significance of the coefficient. The next two rows of coefficients of variables in the regime equal to the time of formation of a bubble equal to 3383 and in the second regime equal to the time of the collapse of the bubble and its continuity equal to -302.34. In the two-regime model, the probability matrix has four components and it is a 2 × 2 matrix, $\begin{bmatrix} 0.75 & 0.17 \\ 0.93 & 0.05 \end{bmatrix}$, which means that the probability of transferring from regime 1 to regime 1 is .75 and .17, and the probability of transferring from regime 2 to regime 2 is .93 and .05. Meanwhile, in the probability matrix, if we were in regime 1 in the period t, i.e. the bubble period, we would remain in the same regime with the probability of 75%. The probability of transferring from regime 1 to regime 2 is 24% and if we were in regime 2 in the period t, we would remain in the same regime with the probability of 93% and we will transfer to regime 1 with the probability of 6%. The graphic diagram of research model is shown in Diagram (2).

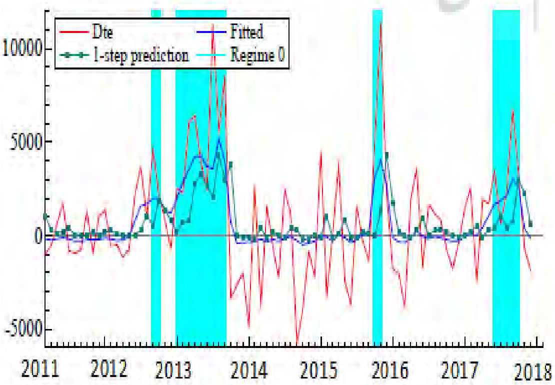

Fig. 2: Displays the graphic diagrams of Residuals

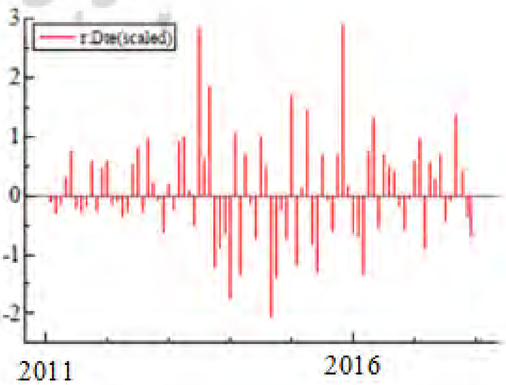

Fig. 3: A graph of the actual, fitted in regime

The Fig. 1 indicates that the error terms are normalized, and this normalization is done by dividing the actual value of the error terms by the standard deviation of the error terms in the regime in which the desired observation is located. When the standard deviation or variance of the error terms is not a function of the regime, there is no difference between the main regression error with the normalized error terms, and all the values of the error terms are divided by a constant number, which is the standard deviation of the error terms. The difference occurs when we consider standard deviation as a function of the regime. In fact, normalization was done to make the errors comparable in different regimes. The second graph also shows actual values, fitted values, predictions for a later period, and also observations in regime one. In this graph, the fitted line is more consistent with actual values, which means that the model has a higher explanatory power. The difference between true values and fitted values is the same as the error terms.

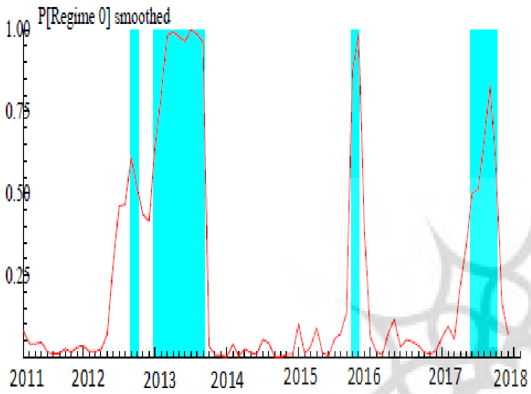

Fig. 4: Graphic diagram of research model (regime1)

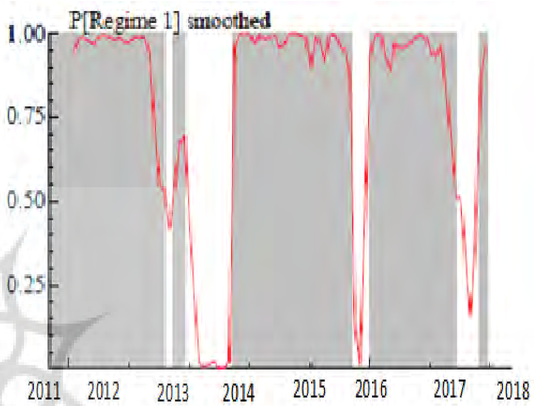

Fig. 5: Graphic diagram of research model (regime 2)

The third graph shows observations that are in regime 1 (bubble period) and the fourth graph shows the observations in regime 2. The results of the observations during the research period show that four bubble periods have existed in the capital market of Iran. The first period is very short-lived from October to November 2011. The second period starts 3 month after bubble collapse and continues 8, starting from March and collapsing in October 2013. The third speculative bubble is 3 months from December 2015 to February 2016. Finally, the fourth period of bubble is 5 months from August to December 2017.

5 Conclusions

Although the financial bubble is pleasant for stock market actors as it gets bigger and bigger and leads to earnings, it's clear that financial bubbles will not be sustainable, and eventually every bubble will burst and create big losses. For this reason, most stock market participants would certainly prefer the range of fluctuations of the stock price index within its fundamental value, and the government avoids policies that set the stage for bubbles and large financial gaps in the stock market. The rise of bubbles and financial gaps in financial markets can lead to instability in the real sector of the economy and impose huge costs on the real sector of the economy. In addition, the formation of bubbles and financial gaps will lead to a massive redistribution of wealth in financial markets and lead to money for jam for many and widespread losses for others. The financial bubbles in the expansion process result in the creation of rents for holders of financial assets. This is assumed in the process of the formation and expansion of financial bubbles, with the increase in the bubble of the price of financial assets, continuously increasing the value of the financial market. The wealth of market participants is continually transmitted through the transaction of financial assets and redistributed. Eventually, in the bubble burst, the value of the financial market falls and the cost of this fall in value will be imposed on holders of financial assets. In fact, in the process of forming, spreading and eventually bursting the bubble, a large amount of wealth from asset holders during the bubble burst period will be transferred to other asset holders prior to the bubble burst stage. Thus, by bursting out a financial bubble, a large amount of wealth is redistributed among market participants of the asset to the benefit of the primary holders and causing loss for the holders of the asset during the bursting period of the bubble. Since the capital market is fraught with similar events, the study of the movement of the capital market over the years can provide the appropriate power to predict the trend of the coming years to analysts. In this research, it was attempted to investigate the capital market of the country during the period from 2011 to 2018 on a monthly basis with two-regime state space method. All bubble formation periods were identified and reported, so that it would be possible to gain power for predicting the future of capital market relying on events that occurred in the past.

The research results of the study period have shown four periods of stock bubble. In this regard, 18 months experienced bubble and high growth and 66 months experienced bubble collapse and continuity. The first phase of the bubble formation was from October to November 2011, the second was 8 months from March to October 2013. The third was too short for about 3 months from December 2015 to February 2016. The results showed that from March 2014 to July 2017, the Iranian capital market has not been entangled with speculation. However, since August 2017 speculation has started and continued until December 2017. In terms of similarity of the research with empirical background, many studies have been conducted to investigate the existence or absence of bubbles in the capital market inside and outside the country with different methods. Most studies such Hu et al. [9], Tarlie et al. [10], Arabs et al. [14], Balcilar et al. [15] and Nneji [16], have identified and reported a bubble period in the stock market. Unlike conventional price bubble detection, Markov switching test and state space are able to check explosive behavior, detect multiple bubbles over a period of time, and accurately estimate the creation and collapse of each bubble. In this study, according to the definition of the two regimes, it has been able to identify the smooth and rugged courses of the research domain and to identify four periods of formation of the bubble and report its collapse time. The results of this research are in line with researchers such as Chen et al. [30] and Hu and Oxley [12, 13].

Given the confirmation of the existence of a bubble in the capital market during four periods and since there is no production in the speculative space, the losses from the money for jam in the stock exchange are ultimately considered to be imposed by the productive forces of the community. In order to prevent the creation of bubbles, it is necessary to prevent tensions and gossip through transparency, and the provision and dissemination of homogeneous and accessible information. Also, real actors should be encouraged to invest in the capital market to increase rationality in decision making and reduce market stress. Since the state space model, which uses the combination of the two-regime Markov switching model used for commercial cycles, is used to detect bubbles, it is suggested to use this method in other macroeconomic variables such as economic bubbles , inflation, exchange rate bubbles as well as bubbles in the housing and other industries. Finally, researchers are recommended to use other Markov methods ((MSM), (MSI), (MSH)) to determine the capital market bubble.

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