

Evaluation of the Relationship between Capital and the Creation of Price Bubbles of listed companies in the Tehran Stock Exchange

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ABSTRACT

From the beginning of 2002 till mid 2003 index grew dramatically in the Tehran Stock Exchange, and from mid-2003 till the end of 2006 we witnessed its decline. This research aims to answer the question of whether the Tehran Stock Exchange was faced with price bubbles during 2002 till 2006 or not, and if yes, to analyze the effective factors in the occurrence of price bubbles and see whether the amount of capital, free float and the composition of shareholders were effective in the occurrence of price bubbles or not.

The method of this study is comparison and correlation with the use of runs tests, chi-square and logistic regression. This study is documental and librarian in terms of information, and practical in terms of purpose.

The results of the study showed that during the mentioned period, price bubble has occurred within the price of shares in the Tehran Stock Exchange and the theory of the existence of price bubble was confirmed, also there is an inverse relationship between the free float of companies and creation of price bubbles. However there is no significant relationship between the amount of capital and composition of shareholders with the creation of price bubbles within the Tehran Stock Exchange.

KEYWORDS: Price bubbles-Amount of capital-Free float-Composition of shareholders-Stock Exchange

INTRODUCTION

As one of the most important investment options, the capital market is counted as good choice for attracting capital and investors choose their preferred stock while considering the degree of risk and expected returns. As a result, capital markets must have the needed efficiency to attract investors and provide financial resources, thus optimal allocation of resources to output. In order for the capital market to reach this level of performance it is necessary to achieve the market volatility on a rational and fundamental factor bases, but nowadays within the economy of many developing countries, the conditions of macroeconomic variables and the stock do not meet the qualifying criteria, and in fact the relationship between economy and stock has been cut. One of the causing factors of these issues is the fluctuations in asset prices, especially stock price bubbles. The bubble phenomenon is a term that appears frequently in the stock market. The concept of bubble entered the economy literature in the early 17th century, and since then numerous examples of price bubbles have been mentioned. During 1998-1990 Japan's assets and during 1998-2000 America's internet market has suffered from the bubble, from which the latter is known as the dot-com mania. [3]

Also in Iran, the decline of Stock happened after a period of dramatic prosperity during mid 2004 which caused many questions to appear in the minds of researchers and experts involved, for example: Are these price increases due to the existence of price bubbles in the Tehran Stock Exchange or not? And so this study examines the existence of a bubble in the price index of Tehran Stock Exchange during the periodof2002till2006, and if the existence of a price bubble is confirmed, to examine its relationship with the amount of capital, free float and composition of shareholders in order to identify the effective factors on the occurrence of price bubbles. [4]

Bubble definitions and research background

A bubble can be described simply as an intense and continuous increase in the price of an asset or set of assets in such a way that the first price increase has been caused by expectations of price increase and thus the attraction of new buyers - mostly speculators interested in profits from trading assets and not profiting from its earning capacity. [5]

Charles King LaBurger (2000), college MIT professor and author of the famous book of the history of financial crises describes bubble as follows: The tremendous amount of inclination of asset prices that ultimately results in its decline. In Palgrave's economic dictionary, Kindleburger describes the bubble as so: the rapid and continuous price inclination of an asset or set of assets that begins with an initial increase and creates an expectation of more increase for new buyers, especially speculators who are more willing to buy and sell shares rather than profit-making assets. [8]

By using the Blanchard and Watson test (1992), Christophe (2003) confirmed the existence of rational inflationary bubbles in America's stock market from 1871 to 2001 and for France from 1951 to 2002, but on long terms and with the use of the MTAR model, rejected the existence of rational inflationary bubbles in USA and France within the mentioned periods. [7]

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By using the Schiller test, white (2004) began analyzing USA's stock market crisis in 1929, and mentioned structural changes as the reason for the stock price volatility and benefits. [1]

From the fractional integration techniques and the ARFIMA model, Quests and Serltis (2005) began analyzing the existence of a unit root in the logarithm of the price - S & P500 index dividend and this theory that exogenous shocks have permanent effects. According to the experimental results, the null hypothesis of the presence of a unit root and thus the presence of rational bubbles in the S & P500 index is strongly rejected, which implies that the price-profit logarithm is a kind of reverse average process. [9]

By using models of both conventional and subliminal accumulation, Nanz and D.E. Silva began analyzing the existence of rational bubbles within 18 stock markets, according to the evaluation of both models, there are explosive bubbles in Chile, Indonesia, Korea and the Philippines' the stock market, and collapsing bubbles in the stock markets of China, Brazil, Venezuela, Colombia, Chile, Indonesia, Korea and the Philippines. [10]

While using the filter rule in their paper, Samadi et al (2007) measured the performance of the Tehran Stock Exchange during the period of 2002 to 2006 with the use of monthly data. They also analyzed the existence of price bubbles for the period after stagnation by using the CAMP method. Based on the obtained results, Tehran's Stock Exchange is not efficient on weak grounds, and according to the CAMP model there are no bubbles in prices and prices of shares have come closer to their intrinsic value during the period under view. [2]

Torki and Vaez (1387) in their paper titled price bubbles and capital market in Iran, by using the RALS technique and the efficiency of the Monte Carlo method began analyzing the existence of price bubbles in Iran's stock market and show that the value of stock has deviated from the long-term equilibrium price path (expected present value of future profits), and so the existence of a price bubble in Iran's stock exchange is confirmed. [11]

The overall aim of this study is that, after studying this research, both investors and stock companies understand the importance of price bubbles in the stock exchanges of the world and also Iran, and by using the study's results to analyze the existence or non existence of bubbles, and in case of existence, to analyze the creating factors of price bubbles in stock companies, and for investors in investments and companies in determining proper amount of capital structure of corporate ownership and equity release to make wiser decisions in their trade.

This study aims to answer the question: Was Tehran's Stock Exchange facing price bubbles phenomenon during the period of 2002 till 2006 or not, and if so to evaluate whether the amount of capital, free float and the composition of shareholders are effective on the occurrence of price bubbles or not?

Accordingly, the research hypotheses are as follows:

The main hypotheses: There was a price bubble in the stock prices of the listed companies in the Tehran Stock Exchange during 2002 to 2006.

Sub-hypothesis 1- There is a relationship between the companies' assets and the formation of price bubbles

Sub-hypotheses 2- There is a relationship between the amount of companies' free float and the formation of price bubbles.

Sub-hypotheses 3- There is a relationship between the composition of shareholders and the formation of price bubbles.

METHOD

This study is effective in terms of aim because it examines the changing relationships of the stock exchange market and intends to explain relationships and to offer suggestions for improving the market's efficiency; furthermore it is a descriptive and co relational study and amidst various co relational studies is a part of the regression analysis. Also its approach is inductive, which means going from a component to a whole. This study is documental and librarian in terms of information. The performed study consists of 4 hypotheses. The needed data for the study have completely been extracted from companies listed in the Tehran Stock Exchange during 2002 till 2006, and for determining the price of each share and the extraction of the needed information, the Stock Exchange organization software and the Rah Avard Novin 3 software were used, then the average data for the mentioned five-year period was calculated. For testing the main hypotheses. Also in this study, in order to analyze the normality of the variables' data the Kalmogrof Smirnoff test was used in which the average variables of the companies' capitol was not normal but however, these variables were normalized using the mathematical function of LN. Also in order to test the study's hypotheses, the Kai do pretesting and regression logistic testing were used.

Operational Definition of Variables: Price bubbles:

The research method used to test the existence of bubble is the serial dependence of returns test. The serial correlation is related to consecutive returns over time. One of the tools for identifying the serial dependence test sequence is the runs test. **Amount of capital:**

Financial capital is defined as the ratio of equity to assets. In this study, the amount of capital has been extracted from the financial statements of the selected companies.

In order to calculate the average investment of the selected companies during the period in question, first the amount of capital of each company was extracted at the end of each year (of the five year period) by using Rahavard Novin software, then from that number, the average assets of the sample companies during the period under review was computed.

Free float shares:

As defined by the Tehran Stock Exchange organization, the free float is the amount of shares expected to be tradable in the near future. This means that it is in the possession of owners who are ready to offer it for sale at an appropriate price. To calculate free float, it is determined by the composition of shareholders meaning which shareholder is a strategic owner and does not intend to transfer his share and usually wants to keep his stock for applying his management. With this assumption, in the evaluation of free float the amount of stock held by the strategic owners is deducted from the total number of shares. The mentioned calculations were done based on international rules in this field, and after the academic society's study and ultimately by using foreign experts' opinions. [4]

Free float for companies in the Tehran Stock Exchange is calculated as follows (Tehran Stock Exchange organization):

- a) Shareholders with the ownership of more or equal to 5% are considered as strategic shareholders.
- b) If the total shares of the family, group and cross ownership shareholders are more than 5%, it is considered as a non-floating point in the calculations.
- c) Labor Shares above 5% of the stock is considered strategic

Composition of shareholders (Entities under the total equity shares)

Composition of shareholders consists of the division of the amount of shares owned by legal entities to the total shares of the company. To calculate the average Shareholders, which means dividing the total equity shares of legal persons to the total shares of the company for the selected companies during the period in question first the composition of shareholders of each firm were extracted on the date of the annual general meeting (period of five years) by using Rahavard Novin software, then the average figure of the mentioned number for the period in question was evaluated

The study's domain

The study's time domain is from the beginning of 2002 till the end of 2006. The reason for choosing this time domain is that during this period the stock index had an unprecedented increase and according to experts, the bubble developed in the price of stock in such a way the total index reached 13882 units from 3788 units within a 5 month period and then declined to 9821 units by the end of this period. The special domain of the study is the total number of listed companies in the Tehran Stock Exchange during the period in question. The chart below shows the fluctuation of the stock index for the period under view:



Stock index volatility chart during the period under view

Study population and sampling methods:

The statistical population of the study comprises of companies listed in the Tehran Stock Exchange the total of which is approximately 400 companies.

Considering the fact that the number of the statistical population of the study is 400, 78 companies were chosen as the statistical sample by using the Cochrane method as explained hereunder:

Equation 3:
$$n \ge \frac{N \times Z_{\frac{\alpha}{2}} \times P \times (1-P)}{(N-1) \times \varepsilon^2 + Z_{\frac{\alpha}{2}}^2 \times P \times (1-P)}$$

In which *n*= the number of sample members

N= the number of members of the statistical society

a= Probability of Type 1 error

P= ration of success in proving the research's hypotheses

P-1= ratio of failure in proving the research's hypotheses

 ε = acceptable variations in reports 400=n 50%=P 50%=P-1 5%=a 10%= ε

$$n \ge \frac{400 \times \left(\frac{1}{96}\right)^2 \times \%50 (1 - \%50)}{(400 - 1) \times (\%10)^2 + \left(\frac{1}{96}\right)^2 \times \%50(1 - \%50)} \approx \frac{77}{6}$$
$$n \ge 78$$

Findings of the study

The main hypothesis:

H1 hypothesis: There is a price bubble in the price of the Tehran Stock Exchange shares.

H0 hypothesis: There is no price bubble in the price of the Tehran Stock Exchange shares.

For carrying out the runs test the average returns for the series of returns are calculated first. The return that is higher than the average will be marked as positive and those that are less than the average will be marked as negative. Then the series of positive and negative marks are counted. The numbers of expected sequences in a random string are calculated with the following formula:

$$E(R) = \frac{2(n_1)(n_2)}{n_1 + n_2} + 1$$

In which E(R) is the expected number of sequences, n_1 is the number of positive returns and n_2 is the number of negative returns. The S standard deviation through a series of specific formulas to set the duration longer than what is expected from a random. And so for this purpose, by calculating the standard deviation of the sequences we address the issue of whether the number of the following sequences is calculated or not:

$$\delta = \sqrt{\frac{2n_1n_{2[2(n_1n_2)-n_1-n_2]}}{(n_1 + n_2)^2(n_1 + n_2 - 1)}}$$

If the t statistic is between +1, 96 to -1, 96 and with a 95% confidence we can say that the H0 hypotheses based on the independence of the sequences (meaning the randomness of return) is confirmed. Also if we assume the confidence interval at 99% then the t statistic should be between +2.576 and -2.576.

If changes in stock prices are correlated with each other, meaning a condition in which stock bubble exists, it can be expected that a series of longer and therefore less than the number of independent observations would exist.

For performing the runs test in this study, first the companies' average weekly time series were evaluated and then each week's return was compared with the obtained averages. If each week's return was below the average would receive a negative sign and if it was larger than the average it would receive a positive sign. And so for the companies' weekly returns a series of positive and negative signs would be obtained. Then all the formed sequences would be counted. Now the total number of positives and negatives are also counted within the time series in question. After this step, the expected number of sequences and their respective standard deviations are calculated in order by the mentioned formula.

Then the significance of the difference between the numbers of the counted sequences with the number of the expected sequences is analyzed for a random variable through the t test. If the test statistic (meaning the difference between the number of counted sequences and the number of expected sequences divided by the standard deviation sequences) would fit between the critical range of +1, 96 to -1, 96, then the number of sequences had no significant relationship with the number of expected sequences; and it can be concluded that the length of the sequences are no different from the length of the random and dependent sequences; and so based on this fact, no bubble exists. But if the test statistic would not fit within the critical area it means that the number of counted sequences is significantly less than the number of expected sequences, and so it can be concluded that the length of the independent and random data and bubble does exist.

For example calculations performed for the two investment companies of Alborz and Mehvarsazan is shown in Table 1.

Table	1.calcu	lations	performed	for th	he two	investment	companies	of	Alborz	and	Mehy	/arsazan

Name of company	Number of weekly return	Number of expected sequence	Number of witnessed sequence	T test statistic	condition
Alborz investment	226	107	83	-3.47	With bubble
Abadan's petrochemichal	239	112	101	-1.64	Without bubble

By using the extracted data from the stock exchange organization through Rahavard Novin 3's up to date software, and the collection and summarization and performance of the Runs test as mentioned above on the data achieved, it became clear that from

within the 87 chosen companies, 44 had bubbles and 34 were without bubbles, and so the hypotheses of the existence of price bubbles within Tehran's stock during 2002 till 2006 is confirmed, and one of the reasons for the declining of prices was the existence of the price bubble within the Tehran Stock Exchange.

Now that the main hypotheses based on the existence of price bubbles within the Tehran Stock Exchange was confirmed by using the runs test. In order to identify the effective factors in the creation of the price bubble, we shall dedicate to analyzing its relationship with the amount of capital, amount of free float and composition of shareholders through using the Chi-square pre-test and the logistic regression test:

Sub-hypothesis 1:

There is a relationship between the amount of company capital and the formation of price bubble.

- H0: There is no relationship between the amount of company capital and the formation of price bubble.
- H1: There is a relationship between the amount of company capital and the formation of price bubble.

I evel of test significance	Level of freedom	Chi-square		
Level of test significance	Level of freedom	Chi-square		
0.934	1	0.007	step	
0.934	1	0.007	block	First step
0.934	1	0.007	model	
0.934	1	-0.007	step	Second step

Table 2: chi-square test for dependent or independent variables

While considering that the chi-square test has not become significant on any level (0.934) there is no dependency between the dependent and independent variable.

Table 3: model abbreviation							
Step	2 log likelihood	Cox and Snell R Square	Nagelkerke R Square				
1	106.83	0.000	0.000				
2	106.84	0.000	0.000				

In the above chart it can be seen that the amount of Nagelkerke R Square is zero, and so the amount of explanation and variation in the dependent variable by the independent variables is zero.

Table 4: Regression coefficients

			0		
Level of significance	Level of freedom	SE	В		
0.934	1	0.150	0.012	Average capital	1 st step
0.186	1	1.72	0.400	Model's permanent	
				amount	
0.259	1	0.228	0.258	Model's permanent	2 nd step
				amount	

In the above chart it can be seen that in the 2^{nd} step of this model, the average capital is removed from the model, and so it has had no effect on the dependent variable, thus the H0 hypotheses is confirmed and the H1 hypotheses is rejected. Therefore there is no relationship between the amount of company capital and the formation of price bubble. Sub-hypotheses 2:

H0: There is no relationship between the average floating shares of companies and the formation of price bubble

H1: There is a relationship between the average floating shares of companies and the formation of price bubble

Table 5: chi-square test for dependent or independent variables

Level of test significance	Level of freedom	Chi-square		
0.000	1	15.58	step	
0.000	1	15.58	block	1 st step
0.000	1	15.58	model	

Considering the fact that the chi-square test has become significant on the level of 1% (0.000), therefore there is a relationship between dependent and independent variables.

|--|

Step	-2 log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	91.26	0.181	0.243

In the above chart it can be seen that the amount of Nagelkerke R Square was 24%, therefore the amount of explanation and variation in the dependent variable by the independent variables was 24%

Table 7: Regression coefficients					
Level of significance	Level of freedom	SE	В		
0.001	1	0.018	-0.057	Average floating capital	1 st step
0.001	1	0.546	1.89	Model's permanent	
				amount	

In the chart above it can be seen that in the first step of this model the test's coefficient level of significance for the amount of permanent and variable average of the floating share has been less than 1%, and so they can enter the model.

(The average floating shares) $-0/057 \ 1/89 =$ companies' bubble condition

According to the above equation the average floating shares to the amount of (-0.057) will result in the decrease of companies' bubble condition, or in other words floating shares have established an inverse relationship with companies' bubble condition. Therefore the H0 hypotheses is rejected and the H1 hypotheses is confirmed, and so there is a relationship between the average floating shares of companies and the formation of price bubbles.

Sub-hypothesis 3:

- H0: There is no relationship between the average composition of shareholders (the capital of legal entities to the company's total capital) and the formation of a price bubble
- H1: There is a relationship between the average composition of shareholders (the capital of legal entities to the company's total capital) and the formation of a price bubble

Table 8:	Chi-square te	st for deper	dent or ind	ependent variables
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Level of test significance	Level of freedom	Chi-square		
0.583	1	0.302	step	
0.583	1	0.302	block	1 st step
0.583	1	0.302	model	
0.583	1	-0.302	step	2 nd step

While considering the fact that the chi-square test has not become significant on any level whatsoever (0.583), thus there is no attachment between dependent and independent variables.

Table 9: model abbreviation							
Step	-2 log likelihood	Cox & Snell R Square	Nagelkerke R Square				
1	106.54	0.004	0.005				
2	106.84	0.000	0.000				

In the above chart it can be seen that the amount of (Nagelkerke R Square) was zero, therefore the amount of explanation and variation in the dependent variable by the independent variable was zero.

		Table 10: Re	egression coefficients		
Level of significance	Level of freedom	SE	В		
0.583	1	0.01	0.005	Average floating capital	1 st step
0.872	1	0.716	-0.115	Model's permanent amount	
0.259	1	0.228	0.258	Model's permanent amount	2 nd step

The above chart shows that in the 2^{nd} step of this model the average shares of persons has left the model, therefore it has had no effect on the dependent variable, and so the H0 hypotheses is confirmed and the H1 hypothesis is rejected. Thus there is no relationship between the average composition of shareholders (the capital of legal entities to the company's total capital) and the formation of a price bubble.

Conclusion

Considering the results of the main and sub hypotheses it was confirmed that Tehran's Stock Exchange suffered from the formation of price bubble during 2002 till 2006. Also by analyzing the effective factors of the formation of the price bubble and the ineffectiveness of the amount of capital and composition of shareholders in the formation of the price bubble, it seems that the amount of capital and composition of shareholders cannot be effective in making decisions for investors and investment in non bubble companies. And so analyzing and studying other forming items of comprising equity of shareholders will be useful.

But considering the result of the 2nd sub-hypothesis test which shows the existence of a reverse relationship between the amount of floating shares and the formation of the price bubble, meaning the higher the amount of floating shares of a company is, there is less of a chance of a price bubble formation, investors are advised to also pay attention to free float shares data alongside other information for investment.Keep your distance with companies with low free float rates especially when experts warn about prices being bubbled, and pay more attention to companies with a higher rate of free float shares.

Considering the importance of the role of the private sector in the capital market and also alongside the increased amount of trade in the market and also considering the study's results, it is suggested that in order to reduce the risk of a price bubble and to deal with such a case, the government, as one of the strategic shareholders, decrease its ownership of stock in the stock companies. In this regards, it is necessary to consider strategies and encouragements so that companies would not be forced to free float their shares. Much like the financial encouragements mentioned in the latest section of direct taxes code article 143 approved in the Persian date of February 1988, and the reforms approved in January of 2002, according to which companies that have at least 20% of free floats at the end of the financial year would have double the 20% exemption from tax credits. Nowadays in many stocks of the world, companies that have less than 25% of free floats will be deleted from the list of companies within the stock market, it is also essential that such measures be taken in Iran. The difference is significant difference between the number of the counting sequence with the number expected for a random variable through a series of t tests were used to justify.

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