Analyzing the impact of financial variables and market characteristics on corporate stock returns in the short and long term after initial public offering

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C H R O N I C L E	A B S T R A C T
	This study examines the relationship between short-term and long-term stock returns of companies after initial public offering by considering financial variables and financial and ownership characteristics of companies on the Tehran Stock Exchange. The research sample includes 4560 companies that were publicly listed on the stock exchange in the period from 2013 to 2024, which constitute a total of 4560 company-years. Econometric methods and vector regression models have been used to test the hypotheses. First, the statistical description of the data has been discussed and then various tests including ADF and PP unit root tests to examine the stationarity of the data, Durbin-Watson test to examine autocorrelation, Chow test, F test and Hausman test have been used to select the appropriate model. The results of these tests show that the main hypothesis of the study is that there is a significant relationship between short-term and long-term stock returns of companies after initial offering is confirmed. Finally, the results of this study can be generalized with 95% confidence to the entire statistical population of the study, namely active investors in the Tehran Stock Exchange. © 2025 by the authors; licensee Growing Science, Canada.

1. Introduction

Initial public offering (IPO) is one of the most important methods of financing for companies, and plays a special role in their growth and development. In the IPO process, a company offers its shares to the public for the first time on the stock market, allowing investors to purchase shares of that company. This process not only provides an opportunity to attract new capital to develop the company's activities, but also allows investors to access shares that were previously only available to a specific group of investors (Singh et al., 2006). However, initial public offering comes with its own challenges and complexities, one of the most important of which is evaluating the company's performance after the initial offering. One of the major issues in initial offerings is examining the stock returns at different time periods after the offering. Research shows that companies usually experience positive returns in the short term after an IPO, but these returns decline in the long term and in many cases, companies perform worse than expected (Ritter & Welch, 2002). This phenomenon, called underpricing, is observed in various markets, especially in the Tehran Stock Exchange. Therefore, analyzing the behavior of stock returns in the short and long term after an initial public offering can help investors and financial analysts make better decisions about their investments. Understanding the decision-making process of market participants has always been a challenging topic for academic circles and even market participants themselves. The formation of herding behaviors of investors is another explanation for how investors make investment decisions among different options. Such behavior is usually a topic of interest to market policymakers, because such behavior can lead to a worsening of the volatility of returns and thus the instability of financial markets, especially in crisis situations.

This study examines the relationship between stock returns in the short and long term after an initial public offering on the Tehran Stock Exchange. In addition, this study analyzes the impact of ownership structure and important variables such as company capital, company profit, price yield, offering price, percentage of real and legal buyers, price to book value ratio, and company quality on stock returns in different periods. The results of this study can help investors and financial analysts to gain a better understanding of the impact of these factors on IPO performance in the Tehran Stock Exchange and make better investment decisions. Also, managers and policymakers can use the results of this study to design appropriate strategies for initial public offerings.

2. Statement of the Problem

Initial public offering (IPO) is one of the most important financing tools for companies, allowing them to use new sources of finance to develop and expand their activities. This process also provides an opportunity for investors to purchase shares of a company that were previously only in the hands of a specific group of investors. In other words, IPO is not only a tool for financing companies, but also allows investors to purchase shares in a company in the early stages of its growth and benefit from the return on their investment (Ljungqvist, Nanda, & Singh, 2006). However, one of the key issues related to IPOs is examining the performance of companies' stocks in the short and long term after the offering. Numerous studies have shown that in many markets, companies experience positive returns in the short term after an initial offering, but in the long term, these returns decline and, in many cases, performance is worse than expected (Ritter & Welch, 2002). This phenomenon, known as "underpricing", can be due to pricing errors, emotional effects, or short-term investor behavior (Ibbotson, 1975). This problem has been observed in various stock exchanges, including the Tehran Stock Exchange, and continues to be a major challenge in analyzing IPOs. In addition, several factors can affect post-IPO stock returns. One of these factors is the company's ownership structure. In particular, whether a larger percentage of the company's shares are held by real or legal investors can affect the pricing and allocation of shares in an IPO (Gompers & Lerner, 2003). Also, variables such as company capital, company profits, price yield, offering price, price-to-book ratio, and company quality can have significant effects on stock returns in the short and long term after the offering (Barber & Lyon, 1997). In particular, companies with a balanced ownership structure and coherent financial strategies may perform better in the stock market after the initial offering. In the Tehran Stock Exchange, which is known as one of the emerging markets in the field of IPO, research has shown that the phenomenon of cheap pricing and reduced returns in the long term is still observed significantly in IPO processes (Abdo Tabrizi et al., 2003; Zaranjad & Anvari, 2005). This issue requires more attention and analysis of the factors that may explain this trend and how these factors can be managed. At first glance, investment strategies aimed at maximizing returns imply that investors' decisions to participate in IPOs should depend more on the quality of the company than on market sentiment (general market sentiment), as previous empirical evidence suggests. Previous studies have shown that institutional investor participation is positively related to IPO performance. On the other hand, retail investor participation is consistent with the concept of return-following tendencies or behavior, and their tendencies are positively related to underpricing and long-term underperformance. This is because they often make a variety of choices that have information asymmetries across the two groups of investors (institutional and retail) regarding the fundamental quality of the IPO company. Institutional investors have an advantage in collecting and analyzing information about the fundamental quality of the IPO company due to their resources and the use of economies of scale. Retail investors, on the other hand, lack access to such analytical skills, especially economies of scale. Thus, the trading done by retail investors' preferences is attributed to the lack of information about the quality of the company. However, what we do not yet know is how different investors behave when they have access to information indicating the fundamental quality of the company and information about the market sentiment indicator at the time of making an investment decision.

The aim of this research is to examine the relationship between the returns of companies' stocks in the short and long term after the initial public offering of shares in the Tehran Stock Exchange. This research also analyzes the variables affecting this relationship such as company capital, company profit, price yield, offering price, percentage of real and legal buyers, price to book value ratio and company quality and will try to identify the factors that can affect a more accurate assessment of initial public offerings in the Tehran Stock Exchange.

3. Theoretical literature review

3.1 Review literature

3.1.1 Behavioral Finance

Behavioral finance examines the biases that investors (individual and professional) have in their investment decision-making process. These biases lead to inefficiencies in market pricing (Muller & Zylka, 2008). He further points out that in the short run, markets are inefficient and mispricing is possible. However, market prices tend to converge to intrinsic prices even if it takes a long time. Modern financial management views individuals and financial markets in a rigid and inflexible manner or through pure mathematical logic. It neglects the fact that the main factor and driver of financial markets is humans, who have psychological characteristics, tendencies, and emotions, and also have many limitations on their path to making absolutely rational and logical decisions. It theorizes on capital markets, and of course, cannot explain and change the behavior of the capital market well with this closed mind. Therefore, the strength and stability of the efficient market, which increased in the 1970s to 1990s, gradually weakened with the creation of inconsistent evidence

and the discovery of empirical irregularities and exceptions (Araghi et al., 2009).

3.1.2 Financial Reporting Quality

Accounting is an information processing system designed to identify, measure, and classify financial events affecting organizations and business units and to report the consequences of such events to decision makers. The concepts, principles, rules, and procedures governing current accounting practice reflect the needs of different groups of users of accounting information over time. The expectations, needs, and demands of users are very diverse and usually determine the type of information that must be provided to serve as a basis for judgment, evaluation, and decision-making. Different groups of users of financial information often require different types of information due to their different relationships with the business unit. Financial reporting goes beyond financial statements and includes other reporting tools such as board reports, periodic reports, and online reporting. Financial reporting is not just a final product, but a process consisting of several components (Saghafi, 1998).

3.1.3 The concept of institutional investors

One of the most common and controversial topics in stock market developments is the growth and expansion of institutional participation (Dianetti, 2012). Institutional investors, as one of the main players in capital markets, are gaining a special place in stock markets around the world (Dargahi, 2012). Institutional investors are the main reviewers of financial markets. Since their influence in corporate governance has increased following the privatization policies adopted by various countries, it can be concluded that institutional investors are of great importance in many corporate governance systems (Najjar and Taylor, 2008).

3.1.4 Initial Public Offering (IPO)

An initial public offering (IPO) is a process in which a private company offers its shares to the public and is listed on a stock exchange. In this process, listed companies offer new shares to public investors with the aim of raising capital for development and growth. In this regard, IPOs are recognized as one of the most important financing tools in financial markets and have a significant impact on how companies perform (Ljungqvist & Wilhelm, 2003).

3.1.5 Initial public offering on the Tehran Stock Exchange

For many years, stocks that are offered for the first time on the Tehran Stock Exchange have been sold through an auction method. In this method, a base price is determined and then buyers enter their orders into the system based on this price, and the price increases accordingly.

The shortcomings of the above methods are summarized as follows:

While there is a main supplier and a large number of uninformed buyers, the forces of supply and demand do not function properly, and it cannot be said that price discovery has occurred based on an auction. If the supplier places its bid price after a few minutes of competition among buyers, and this bid price is 50 to 100 percent different from the bid price of all buyers, this is not a case of a complete auction and competition for price discovery.

From the time the market watchdog sends the message regarding the symbol opening until the time the supplier presents its proposed price, there is a very limited opportunity for consultation and decision-making. The larger the company (such as Persian Gulf Petrochemical Industries), the more limited the time for decision-making and the opportunity for information transfer. Even for investment company managers who must coordinate some decisions with their board members, this time is very limited and another obstacle to price discovery. The pressure from real and legal shareholders on brokers to allocate more shares if the price is appropriate in their opinion. The phenomenon of buying initial public offerings at any price (given the growth of most of these stocks after the offering) completely disrupts the precise decision-making relationships within brokerages. The larger the share and the larger the buyer brokerage firm and the more customers it has. The chaos in initial public offerings is more evident within that company. To solve these problems, a plan to change the initial public offering has been sent to the organization in the form of an initial public offering manual, in which the Tehran Stock Exchange has proposed that the initial public offering methods be changed to the order registration method. This method is currently being reviewed in the form of an initial public offering manual and will be notified to the stock exchange organization for implementation after approval (Dianati 2012).

3.1.6 Underpricing

One of the basic concepts in the field of IPO is "underpricing" which is commonly observed. This phenomenon means pricing the shares below their actual value at the time of the initial offering, which usually occurs due to various factors such as insufficient information, strategic decisions of company managers or market conditions (Ritter, 1991). Numerous studies have shown that initial offerings in many financial markets are associated with positive returns in the short term, but in the long term, this return decreases and leads to negative fluctuations. This can be due to the information asymmetry between investors and the stock issuer at the time of determining the offering price and the inability to predict the long-term growth of companies (Ljungqvist, 2007).

3.1.7 Short-term and long-term performance of stocks after an IPO

Research has shown that companies perform positively in the short term after an initial public offering and their stock returns increase. This increase in the short term is usually due to strong market demand for shares. However, in the long term, this return usually decreases and, in many cases, the company's shares return to below their initial price. This is related to problems such as incorrect valuation of companies at the time of IPO, changes in market demand, or weaknesses in the financial and management strategies of companies (Ljungqvist, 2007; Thaqafi & Arab-Mazar Yazdi, 2010).

3.1.8 Ownership Structure and Its Impact on IPO

The ownership structure of a company can has a significant impact on how a stock performs in the market after an initial public offering. Research has shown that companies with a higher percentage of their shares held by legal investors tend to perform better in the long run. This is because legal investors are generally more effective in monitoring management's strategies and decisions and helping to protect the company's long-term interests (Gompers & Lerner, 2003).

3.1.9 Variables Affecting Post-IPO Stock Performance

In addition to ownership structure, several factors can affect the performance of a company's stock in the short and long term. These variables include the company's capitalization, profitability, price yield, offering price, percentage of legal and real buyers, price-to-book ratio, and company quality. Companies with high financial resources, a strong track record, and coherent strategies tend to perform better after an initial public offering. Also, the offering price and the price-to-book ratio can be considered as important tools for predicting the success or failure of an IPO (Bradley et al., 2003; Chen & Ritter, 2000).

3.1.10 IPO Pricing Theories and Models

There are various theories regarding IPO pricing. One of the most famous theories is the pricing model based on asymmetric information, which states that companies offering shares have more information than public investors. This information asymmetry causes stock pricing in IPOs to be erroneous and leads to the phenomenon of cheap pricing. Also, in some cases, models based on market demand can affect pricing effects and severe market fluctuations can lead to an increase or decrease in stock prices (Rock, 1986).

3.1.11 Company Quality and Its Role in IPO

Company quality is considered as one of the key variables in evaluating IPOs. Companies with strong governance structures, transparent information, and high accounting standards tend to be more successful in the post-IPO stages. These companies can gain investor confidence and demonstrate long-term sustainability of their returns. Company quality can also influence the offering price and advertising strategies, which directly affect stock returns (Bradley et al., 2003).

3.1.12 Emotional and psychological effects on IPOs

IPO markets are influenced by investors' emotions and unrealistic expectations. Market emotions can lead to irrational stock pricing at the outset. In many cases, the collective behavior and emotional decisions of investors lead to price bubbles in the IPO market. These bubbles may be particularly severe in emerging markets such as the Tehran Stock Exchange (Ljungqvist & Wilhelm, 2003).

3.2 Research background

In 2003, Abduh Tabrizi and colleagues, after examining 104 companies listed on the Tehran Stock Exchange between 1990 and 2005, observed high returns in the short term and low returns in the long term in relation to IPOs. In 2006, Ebrahimi Kordlor and others, through a study on 30 companies offering shares for the first time on the Tehran Stock Exchange between 1999 and 2001, have considered the reason for the cheap sale of shares and the decline in the performance of IPO shares to be the poor information efficiency of the Iranian capital market because it is difficult to access information about companies and their performance. Therefore, investors do not have sufficient knowledge and insight to analyze information. These researchers consider the main root of such problems in the country's capital market to be the presence of major shareholders, including institutions, government-affiliated organizations, and banks in the market. Singh et al. (2006) in a study, they examined the factors affecting the pricing and allocation of initial public offerings in different markets. The results show that cultural and institutional differences have a significant impact on the initial public offering processes. Jiang et al. (2009) examined the impact of ownership structure, especially the ownership ratio of investment institutions, on the performance of IPOs in different markets and found that the ownership structure of companies has a significant impact on the pricing and long-term performance of IPOs. Companies with more investment institutions usually perform better in IPOs and also perform better in the long run. In his study, Arjalies (2010) examined the impact of ownership structure on IPO pricing and stock allocation. The results show that companies with higher family ownership perform better in IPOs and, as a result, investors from these types of companies receive higher returns in the short run.

Bagherzadeh et al. (2011) this study examined the factors affecting the short-term returns of initial public offerings on the Tehran Stock Exchange. The results show that initial public offerings in Iran have generated positive abnormal returns in the short term, but their amount has been lower than in other markets.

In another study, Sanginian et al. (2014) examined the short-term and long-term returns of shares offered in initial public offerings on the Tehran Stock Exchange and identified the factors affecting them in the period 2006-2011. The findings of the study show that although initial public offerings in Iran, in accordance with the findings of studies conducted in other countries, have created positive abnormal returns for buyers in the short term, its amount is among the lowest compared to the abnormal returns created in developing and even developed stock exchanges. Also, the long-term returns of initial public offerings of government and non-government companies compared to the market index are consistent with the results of empirical studies in other countries.

4. Research Methods

This This research is descriptive-analytical research that examines the relationships between different variables. The main objective of this research is to identify and analyze the relationship between the stock returns of companies in the short and long term after the initial public offering of shares. In particular, this research examines factors such as company capital, company profit, price return, offering price, percentage of real and legal buyers, price to book value ratio and company quality and examines the effect of these factors on stock returns in different time periods.

The present research is designed based on a hypothesis that is tested using two main econometric models. Accordingly, simple and multiple regression methods will be used to evaluate the hypotheses, and stepwise and data entry techniques will be used to examine the effect of variables.

To use regression, certain assumptions must first be considered. In any multiple linear regression model, it is assumed that the correctness of these assumptions will make the regression results valid, otherwise another model must be substituted. These assumptions include: 1- normality of the data, 2- constant variances, 3- independence of variables, and 4- collinearity. These assumptions are examined through the model residuals test, the details of which are given at the end of the chapter. In this way, the normality of the data is first examined. For this purpose, all variables are entered into the model and based on it, several diagnostic variables are created. These variables include: 1- the predicted variable based on all variables, 2- the standardized predicted variable, 3- the residual variable, and 4- the standardized residual variable. These created variables are necessary to examine and test the model assumptions. In line with this process, in the initial implementation of the model, first, using the Chow and Hausman statistics, the appropriate model type for regression fitting (pooled data or panel with fixed and random effects) is determined, and then using the Im, Pesaran and Shin (IPS) stationarity test, the reliability of the variables will be examined.

In the secondary implementation of the model, the classical assumptions of regression, including the normality of the distribution of variables, the independence of the error distribution, the normality of the error distribution, the heteroscedasticity of variances, and the independence of the independent variables, have been examined. Finally, in the final implementation of the model, the final model has been extracted based on the significance of the entire model and the significance of each of the model coefficients. In addition, the T-Test test has been used to examine the difference in the model predictions. Also, to ensure the reliability of the results, pre-tests of the use of the regression model have been used.

Excel software was used to analyze the collected data, and SPSS and EViews statistical software were used to test the hypotheses and to perform additional tests to ensure the regression model. Therefore, bivariate and multivariate regression were used to test the hypotheses, before and after the control variables were entered. The statistical population of this study includes all companies that had their first initial public offering (IPO) on the Tehran Stock Exchange between April 2013 and March 2024 (over a ten-year period), and their shares were traded on the market during this period, and their financial information was also available. Based on the above conditions, the total number of companies included in this period was 4560 companies, and the data and information related to them were collected through audited financial statements and official reports published by the companies and then subjected to statistical analysis. Two types of statistical methods were used for statistical analysis of the data and testing the hypothesis of the present study:

1- Descriptive statistics; using central indices such as mean, median and dispersion indices such as standard deviation, skewness and stretch to describe the variables and the type of data distribution.

2- Inferential statistics; in two parts:

A- Regression model default test: Data non-autocorrelation test (Durin-Watson test).

B- Main test: Including Chow, F-limer, Hausman and regression tests were used with Eviews7 software, and Pearson correlation test was used to determine the significance of the correlation between the research variables.

4.1 Variables and research hypothesis

In this study, various variables have been identified and examined as factors affecting post-IPO stock returns. These variables are as shown in the table below:

Table 1
Study Guide to Research Symbols and Variables

Variable Name	Variable Type	Definition
Return of price	Dependent variable	Changes in the price of companies' shares in the short and long term after the initial offering, which is considered the main variable of the research.
Capital of company's	Independent variable	The size and volume of a company's capital, which is considered an indicator of its financial strength and growth capacity.
Profit of company's	Independent variable	The profitability performance of companies, which is usually considered a measure of financial strength and sustainability.
Equity ratio	Independent variable	The quality of management, transparent information, and accounting standards of the company
Price/Book Value Ratio (P/VB)	Independent variable	Comparing the stock price with its book value to measure the value of the company.
Institutional investors	Independent variable	The amount of investment by legal individuals that can affect the pricing and success of the initial offering.
Offer price	Independent variable	the price at which a market-maker or institution is prepared to sell securities or other assets.

$$\text{Return of price }_{ij} = \beta_0 + \beta_1. \text{ institutional investors. } + \beta_2. \text{Ln.}(P/BV) + \beta_3. \text{Ln. (Equity ratio)} + \beta_4. \text{Ln. (capital of company's)}$$

$$+ \beta_5. \text{Ln. (profit of company's)} + \beta_6. \text{Offer price }_{ij} \sum_{k=1}^{11} \beta_k Iindustry + e_j$$

5. Research Results and Discussion

5.1 Descriptive Statistics

In this section, information related to 4560 sample companies during the years 2013 to 2024, which is a total of 4560 company-years, is examined. Table 2 provides a summary of descriptive statistics related to the research variables.

Table 2
Descriptive statistics of research variables

Variable	Mean	Median	Maximum	Minimum	Deviation Skewness	Standard Coefficient	Elongation Coefficient	Jarco-Barra
Offer price $_{ij}$	1419.822	1559.000	5055966.	-673	456370.1	6.797510	63.82244	46510.83
Institutional investors	0.644951	0.669100	1.000000	0.000000	0.234599	-1.003961	3.405669	50.33727
Ln.(P/BV)	0.474833	0.383347	2.199237	0.031498	0.339245	1.412089	5.207425	137.1119
Equity ratio	0.116538	0.035320	6.183034	1.38-05	0.483341	10.31087	122.1730	164627.0
Capital of company's	1311035.	241427.0	29143041	-466746	3127317.	4.655131	32.82013	11521.85
r-profit of company's	422458.9	41002.00	10674332	-3445928	1344041.	4.172155	25.14476	6393.182
Industrial	0.867143	1.00	1.000	0.050	0.332554	-2.042741	5.155667	251.2150
Return of price $_{ij}$	0.231057	0.197709	3.141038	-1.717646	0.837754	0.174167	4.537860	31.71535

The mean, as the most important central indicator, indicates the equilibrium point and center of gravity of the distribution and serves as a suitable measure for expressing the centrality of the data. The median is the value below which 50% of the sample data are located and above which 50% are located. In general, the median is used as a measure of the tendency to the center of distributions whose shape is asymmetrical. The standard deviation, which is known as the most important dispersion parameter, is obtained from the square root of the variance and indicates the average fluctuation of observations from their mean. Also, the skewness coefficient indicates the dispersion of the distribution relative to the normal distribution. According to the above interpretations, as can be seen from the table, the mean of the supply price variable is 1419.822. This means that the average offering price of companies in the period 2013 to 2024 was 1419.822. Also, the percentage of legal buyers has an average of 0.644951 in the sample companies. The average variable of the book-to-market value ratio is also 0.464858, which indicates the difference between the book value and the market. The reason for the positiveness of this ratio is the positive book value of some companies. In the following, the research hypothesis will be tested and the results will be interpreted using the relevant statistics.

5.2 Descriptive Statistics

The reliability of research variables means that the mean and variance of the variables over time and the covariance of the variables between different years have been constant. If the research variables are not constant, whether in the case of time

series data or in combined data, it will cause the problem of false regression (Zeranjad & Anvari, 2005). Therefore, before testing the hypotheses, it is necessary to analyze the data. For this reason, before comparing the models, the reliability of the research variables was first examined with the Levine, Lin, and Cho test using the software (EVIWS7). The general results of these tests are presented in Table 3.

Table 3
Data reliability test results

Variable	Evin, Lin, and Cho test statistic	Significance level	Result
Ln.(P/BV)	-0.346547	0/00000	At a stable level
Equity ratio	-1.927576	0/00000	At a stable level
Offer price $_{ij}$	-1.537331	0/00000	At a stable level
Capital of company's	8.886415	0/00000	At a stable level
Profit of company's	-5.366436	0/00000	At a stable level
Industrial	0.323007	0/00000	At a stable level
Institutional investors	-0.310470	0/00000	At a stable level
Return of price $_{ij}$	1.144398	0/00000	At a stable level

The presented statistical results show that all variables are stable at the level based on the test performed, at a 5 percent error level, and therefore there is no need to test the covariance of the model variables. In other words: according to the results of these three tests, since the P value is less than 0.05, the research variables are stable during the research period.

5.3 Test for checking the assumption of normality of data

Since the normality of the dependent variable leads to the normality of the model residuals; it is necessary to check its normality before fitting the model. Therefore, in this test, the null hypothesis and the opposite hypothesis of the normality test are as follows:

H$_0$: *The data distribution is normal.*

H$_1$: *The data distribution is not normal.*

The Kolmogorov-Smirnov test was used to test the above hypothesis. In this test, whenever the significance level is less than 5%, the null hypothesis is rejected at the 95% confidence level.

Table 4
Kolmogorov-Smirnov (K-S) test to check the assumption of normality of research variables

Variable	Number of samples	Kolmogorov-Smirnov Z	Asymp. Sig. (2-tailed)	Hypothesis result
Ln.(P/BV)	14265	1.913	0.108	.The hypothesis (H$_0$) is confirmed
Equity ratio	14265	2.738	0.133	The hypothesis (H$_0$) is confirmed
Offer price $_{ij}$	14265	2.792	0.249	The hypothesis (H$_0$) is confirmed
capital of company's	14265	6.654	0.445	The hypothesis (H$_0$) is confirmed
profit of company's	14265	5.913	0.869	The hypothesis (H$_0$) is confirmed
Industrial	14265	8.587	0.237	The hypothesis (H$_0$) is confirmed
Institutional investors	14265	2.217	0.255	The hypothesis (H$_0$) is confirmed
Return of price $_{ij}$	14265	1.518	0.242	The hypothesis (H$_0$) is confirmed

Based on the values presented in Table 4, the Kolmogorov-Smirnov (K-S) test to examine the assumption of normality of the variables, it can be stated that, since the significance level values for the independent and dependent variables in the time series from 2013 to 2024 in the model are more than 5% (Sig > 0.05), therefore the null hypothesis, that is, the normality of the variables, is confirmed.

5.4 Unit root test and stationarity of model variables

Generalized Dickey-Fuller Test: One of the most useful tests for stationarity is the generalized Dickey-Fuller test. Suppose that the series yt is, in its simplest form, a first-order autoregressive model; $(y_t) = \alpha + \beta \cdot y_{t-1} + \varepsilon_t$ that is, if $|\alpha| \prec 1$ it is, then the series is stationary. Therefore, in this test, the null hypothesis is evidence of non-stationarity, and the desired state occurs when the null hypothesis is rejected, i.e. $(H0 : \alpha = 1)$.

H$_0$: *The variable in question has a unit root. (Expressing non-stationarity or non-stationarity of the variable).*

H$_1$: *The variable in question does not have a unit root. (Expressing stationarity or stationery of the variable).*

Table 5

Results of ADF and PP unit root tests for variables

Variable name	augmented Dicky Fuller		Philips Perron	
Independent variable (Offer price)	**First order difference**	**Second order difference**	**First order difference**	**Second order difference**
	-6.716900	-9.710441	-10.97061	**-52.91420**
Importance level (significance)	**Test results**			
1% (one percent)	-3.333823	-3.454085	-3.453567	**-3.453652**
5% (five percent)	-2.871768	-2.871883	-2.871656	**-2.871693**
10% (ten percent)	-2.572293	-2.572354	-2.572233	**-2.572253**
Dependent variable (Return of price $_{ij}$)	**First order difference**	**Second order difference**	**First order difference**	**Second order difference**
	-9.709543	-10.24570	-16.29096	**-206.9851**
Importance level(significance)	**Test results**			
1% (one percent)	-3.453652	-3.454263	-3.453567	**-3.453652**
5% (five percent)	-2.871693	-2.871961	-2.871656	**-2.871693**
10% (ten percent)	-2.572253	-2.572396	-2.572233	**-2.572253**
Dependent variable (Ln. (BV/P) $_{ij}$)	**First order difference**	**Second order difference**	**First order difference**	**Second order difference**
	-3.020417	5.896799	5.739161	**-13.59165**
Importance level(significance)	**Test results**			
1% (one percent)	-3.454719	-3.454812	-3.453567	**-3.453652**
5% (five percent)	-2.872162	-2.872203	-2.871656	**-2.871693**
10% (ten percent)	-2.572503	-2.572525	-2.572233	**-2.572253**
Dependent variable (Institutional investors)	**First order difference**	**Second order difference**	**First order difference**	**Second order difference**
	-7.310477	-16.18856	-7.620359	**-28.12962**
Importance level(significance)	**Test results**			
1% (one percent)	-3.453567	-3.453737	-3.453567	**-3.453652**
5% (five percent)	-2.871656	-2.871731	-2.871656	**-2.871693**
10% (ten percent)	-2.572233	-2.572273	-2.572233	**-2.572253**
Dependent variable (Equity ratio)	**First order difference**	**Second order difference**	**First order difference**	**Second order difference**
	-15.87731	-14.13867	-15.89414	**-106.8782**
Importance level(significance)	**Test results**			
1% (one percent)	-3.453567	-3.453910	-3.453567	**-3.453652**
5% (five percent)	-2.871656	-2.871806	-2.871656	**-2.871693**
10% (ten percent)	-2.572233	-2.572313	-2.572233	**-2.572253**
Dependent variable (capital of company's)	**First order difference**	**Second order difference**	**First order difference**	**Second order difference**
	-6.359145	-19.36440	-6.359145	**-28.45487**
Importance level(significance)	**Test results**			
1% (one percent)	-3.453567	-3.453652	-3.453567	**-3.453652**
5% (five percent)	-2.871656	-2.871693	-2.871656	**-2.871693**
10% (ten percent)	-2.572233	-2.572253	-2.572233	**-2.572253**
Dependent variable (profit of company's)	**First order difference**	**Second order difference**	**First order difference**	**Second order difference**
	-8.721298	-14.41627	-9.225121	**-42.50385**
Importance level(significance)	**Test results**			
1% (one percent)	-3.453567	-3.453823	-3.453567	**-3.453652**
5% (five percent)	-2.871656	-2.871768	-2.871656	**-2.871693**
10% (ten percent)	-2.572233	-2.572293	-2.572233	**-2.572253**

As can be seen, based on the results of these two tests, the variables are stationary over time. Therefore, as can be seen from the test results, the hypothesis of having a unit root has been strongly rejected for all data related to the time series 2013-2024 and it has been shown that all data are stationary. Therefore, in the following, we will test the research hypotheses based on the research variables.

6. Results Analysis

6.1 Durbin Watson Test

The Durbin Watson test is one of the most famous tests for detecting autocorrelation. Of course, in order to use this test, the conditions mentioned below need to be met.

6.2 Investigating the heterogeneity of variance

The LM Arch test was used to investigate the existence of heterogeneity of variance of the disturbing sentences. The results of the LM Arch model heterogeneity test for the companies in the research statistical population are as follows:

Table 6
Results of the LM Arch heteroscedasticity test

Description	Statistical value	Significance level	Test level
F-statistic	7.017433	0.001	0/05
Obs*R-squared	13.85335	0.0009	0/05

Given that the statistic of this test is not significant at the 5% level, the assumption of heteroscedasticity of variance is rejected and the homogeneity of variance of the disturbance terms is accepted. Therefore, the (OLS) method is used.

6.3 Autocorrelation test results

In order to test the absence of autocorrelation in the model, the Durbin-Watson statistic is used. This statistic, based on the research findings, shows that this value is within the acceptable range for the research model. If this statistic is in the range of 1.5 to 2.5, the hypothesis (H_0) of the test, that is, the absence of correlation between the residuals, is accepted, and otherwise the hypothesis (H_0) is rejected, meaning that it can be accepted that there is a correlation between the residuals. According to the obtained statistic, it can be accepted that there is no positive or negative correlation in this model.

6.4 Results of the Chow test, F test and Housman test

In the use of mixed data, various models are used to test hypotheses. These models include methods such as the fixed and random effects model, the seemingly unrelated regression model, and the pooled data model (POOL), for which various tests such as the Chow test, the F test, and the Hausman test are used to determine the method of estimating the model and the results of the hypothesis test (Rida, 2024). The results of the Chow test are presented in Table 6. The assumptions of the Chow test are as follows:

H_0: *The Random Effect model*

H_1: *The Fixed Effect model*

Table 7
Chow test results

Model	Significance Level of Test	Test Result
Research Model	0.0000	Confirmation of Fixed Effects Model

As is clear from the table above, the null hypothesis of the Chow test in the research model is rejected at a significance level of 95%. In other words, the results of the Chow test indicate the use of a fixed effects model. The F test was used to test the equality of the coefficients of the width of the origin of different sections, and the Hausman test was also used to explain the fixed effects and random effects models. The results of these two tests are shown in Tables 8 and 9.

Table 8
F-test results

Description	Statistical value	Degrees of freedom	Significance level	Test level
Cross-section F	15.68922	(279.000)	0.0000	0.05

The results of the above test show that the value of the F test statistic is 15.68922 and the significance level is smaller than the test level, which indicates that the width is different from the origins of different sections and the fixed effects method is accepted. Now, in order to determine the use of the fixed effects method versus random effects, we use the Hausman test. This test is based on the presence or absence of a relationship between the estimated regression error and the independent variables of the model. If such a relationship exists, the fixed effect model will be used, and if this relationship does not exist, the random effect model will be used. The hypothesis H_0 indicates the absence of a relationship between the independent variables and the estimation error, and the hypothesis H_1 indicates the existence of a relationship (Zara-Nejad and Anvari, 2005). The results of the Hausman test are presented in Table 8.

Table 9

Hausman test results

Model	Significance Level of Test	Test Result
Research Model	0.0000	Fixed Effects Model Verification

As can be seen from the table above, the null hypothesis of the Hausman test is rejected, in other words, the model should be estimated using the fixed effects method. The estimation results of each model are given in a separate table below.

6.5 Test of unequal variance

One of the methods of detecting inequality of variance is White's test. In this test, hypothesis H_0 indicates the equality of variances and hypothesis H_1 indicates its opposite (Hamidian et al., 2025). The results of this test for the research model are given in Table 9.

Table 10

Heterogeneity of Variance Test (White)

F-statistics	0.248751	Prob. F (2,997)	0.785412
Lagrange coefficients (observation * R squared)	0.473519	Prob. Chi-Square (2)	0.736758

As the results of the F test and the results of the Lagrange coefficients test (Chi-Do) show, the null hypothesis based on equality of variances is supported at the 5% level. Therefore, the research model has equality of variance.

6.5 Results of the research hypothesis test

Research hypothesis: There is a significant relationship between the stock returns of companies in the short-term period after the initial public offering and in the long-term period.

Return of price $_{ij}$ = β_0 + β_1. institutional investors. + β_2. Ln.(P/BV) + β_3. Ln. (Equity ratio) + β_4. Ln. (capital of company's) + β_5. Ln. (profit of company's) + β_6. Offer price $_{ij}$ $\sum_{k=1}^{11} \beta_k Iindustry$ + e_j

H_0: *There is no significant relationship between the stock returns of companies in the short-term period after the initial public offering and in the long-term period.*

H_1: *There is a significant relationship between the stock returns of companies in the short-term period after the initial public offering and in the long-term period.*

Considering the above, regression (OLS) and fixed effects model have been used in this study. Table 10 shows the results of the model test.

Table 11

Regression test results - dependent variable: Return price

Variable	coefficient	Standard deviation	T-statistic	Significance level	Relationship type	Confidence level
C	0.636778	0.157806	3.932212	0.0002	Positively significant	95%
Offer price	-5.9808	1.3507	-0.422812	0.0001	negative Significant	95%
Institutional investors	-0.043733	0.188249	-0.228093	0.0001	negatively Significant	95%
Ln.(P/BV)	-0.371303	0.145831	-2.585693	0.01	negatively Significant	95%
Equity ratio	0.018762	0.091599	0.207109	0.0001	Positively significant	95%
capital of company's	2.5008	3.4511	0.724028	0.0001	Positively significant	95%
profit of company's	-7.6908	6.4508	-1.191322	0.0001	negatively Significant	95%
Industrial	-0.267422	0.116337	-2.227826	0.0002	negatively Significant	95%
Weighted statistics of the model	Coefficient of determination	Adjusted coefficient of determination	Deviation from the regression mean	F-Statistic	Significance Level of the F-Statistic	Durbin-Watson
	0.47918	0.22562	0.669139	2.035882	0.051332	2.010274

Based on the results obtained from the regression model test of the third equation, in which the dependent variable is the return price, and in accordance with Table (10), the significance level of the F statistic (Prob (F-statistic)) is reported to be 0.0000. This value indicates that the entire regression model is significant at the 95% confidence level and that a valid relationship exists between the independent variables and the dependent variable.

Also, the coefficient of determination (R^2) is 0.49718, which indicates that about 50 percent of the changes in the dependent variable (return price) are explained by the independent variables in the model; this value indicates the relatively appropriate explanatory power of the model.

Based on the values of the t statistic and the corresponding significance levels, the research hypothesis that "there is a significant relationship between the returns of companies' stocks in the short-term period after the initial offering and in the long-term period" is confirmed.

Importantly, this relationship is reported to be positive and direct, meaning that companies that have high returns in the short term after an IPO tend to have higher returns in the long term as well, although these returns may be lower than in the initial period. Therefore, the behavior of stock returns in the short term can be somewhat predictive of its long-term returns.

7. Conclusions and recommendation

7.1   Conclusions

In this part of the study, an attempt is made to examine, discuss and conclude the results of the research hypothesis.

The hypothesis based on the fact that "there is a significant relationship between the stock returns of companies in the short-term period after the initial offering and in the long-term period" was confirmed.

The test results indicate that the lower the coefficient of the offering price variable of the companies in the sample under study, the higher the dependent variable of the price return of the sample companies. This finding is consistent with the findings of Abdou Tabrizi et al. (2003) and Drabetz et al. (2003).

7.2   Practical suggestion based on research results

Given that the results of the research hypothesis test showed that: There is a significant relationship between the shares of companies in the short-term period after the initial public offering and in the long-term period. Therefore, it is suggested that: For companies that are in the position of initial public offerings (IPO), make appropriate decisions to eliminate or reduce at once or gradually the effects of initial public offerings (IPO) on the return on shares of both the offered price level and the trading volume level in the trading process. In this way, it causes less loss to the company's shareholders. Of course, in this regard, the principled pricing of initial public offerings (IPO) can be effective.

7.3   Suggestions for future research

Investigating the effect of variables such as industry type, company size, and short-term and long-term returns and their relationship with the price-to-book value (P/BV) ratio of companies listed and active on the Tehran Stock Exchange should be considered.

Investigating the effect of variables such as market index and economic conditions on price deviation in initial public offerings of companies listed on the Tehran Stock Exchange.

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12

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