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AN ANALYSIS OF UNDERPRICING FACTS AND THE FACTORS AFFECTING THE SHORT TERM PERFORMANCE OF INITIAL PUBLIC OFFERINGS IN BORSA ISTANBUL*

BORSA İSTANBUL'DA İLK HALKA ARZLARDA DÜŞÜK FİYATLANDIRMA, KISA DÖNEM GETİRİLERİ ETKİLEYEN FAKTÖRLERİN ANALİZİ

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Abstract

This study aims to explore the phenomenon of underpricing, the existence of a hot issue market, the sectoral variations in underpricing, and the factors influencing underpricing and short-run performance of 183 stocks that had their initial public offerings (IPOs) on Borsa Istanbul (BİST) between 2010 and May 2022, with a focus on how these factors relate to the ex-ante uncertainty hypothesis. Multiple linear regression analysis and ANOVA analyses were utilized in the study. According to the findings, it is observed that the first-day returns are positive and underpricing is present. The findings indicate that the leverage ratio, asset size, and net proceeds from the IPO negatively impact underpricing. These results imply that the altered risk profile does not account for the significant abnormal returns observed on the first day. It is observed that the first-day and 30-day cumulative abnormal returns do not vary by sector. In our study investigating the existence of a hot issue market, it is found that the initial day returns of firms taking advantage of window of opportunities do not alter from those of firms going public in years with lower IPO volumes. This study demonstrates a statistically significant relationship between first-day abnormal returns, the

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standard deviation of 30-day cumulative abnormal returns, the BİST30 index's standard deviation prior to the IPO, and the liquidity ratio as independent variables, and the 30-day cumulative abnormal returns. It is observed that the firms in the high-risk group had higher 30-day cumulative abnormal returns compared to firms in the low and medium-risk categories.
Keywords: Initial public offering (IPO), underpricing, short-run performance
JEL Classification: G10, G30

Öz

Çalışmanın amacı, BİST'de 2010-2022/5 yılları arasında ilk halka arzı gerçekleşen 183 pay senedi üzerinde düşük fiyatlandırma olgusunu, sıcak halka arz piyasasının varlığını, düşük fiyatlandırmanın sektörlere göre değişimini, düşük fiyatlandırma ve kısa dönem performanslarını etkileyen faktörleri ex-ante belirsizliği hipotezi ile de ilişkilendirerek araştırmaktır. Çalışmada çoklu doğrusal regresyon analizi ve ANOVA analizleri kullanılmıştır. Çalışmanın bulgularına göre, ilk işlem günü getirinin pozitif olduğu, düşük fiyatlandırma yapıldığı gözlemlenmiştir. Kaldıraç oranı, aktif büyülüğü ve halka arzdan elde edilen net hasılatın; düşük fiyatlandırma üzerinde negatif etkisi olduğu sonucuna ulaşılmıştır. Bu bulgular, değişen risk kompozisyonunun yüksek ilk gün anormal getiriyi açıklayamadığını göstermektedir. İlk gün ve 30 günlük birikimli anormal getirilerin sektörlere göre değişiklik göstermediği gözlemlenmiştir. Bu çalışmada, sıcak halka arz piyasasının varlığını araştırırken, fırsatlar penceresinden yararlanan firmaların ilk gün getirilerinin, halka arz hacminin daha düşük olduğu yıllarda halka arz gerçekleştiren firmaların ilk gün getirilerinden farklı olmadığı sonucuna varılmıştır. İlk gün anormal getiriler, 30 günlük kümülatif anormal getirilerin standart sapması, halka arzdan önceki 30 günlük endeksin standart sapması ve likidite oranı bağımsız değişkenleri ile 30 günlük kümülatif anormal getiriler arasında istatistiksel olarak anlamlı bir ilişki tespit edilmiştir. Yüksek risk grubundaki firmaların 30 günlük kümülatif anormal getirilerinin, düşük ve orta risk kategorisindeki firmalara kıyasla daha yüksek olduğu gözlemlenmiştir.
Anahtar Kelimler: İlk halka arz, düşük fiyatlama, kısa dönem performans
JEL Sınıflandırılması: G10, G30

1. Introduction

Determining the IPO price correctly has a huge impact on IPO success. Factors such as the return that investors can obtain, maximizing the worth of the company in the secondary market, and providing the company with high sales revenue are taken into account when determining initial public offering (IPO) prices.

Underpricing occurs when shares are offered at a price lower than their true value during an IPO, leading to an increase in the market price once the shares begin trading on the secondary market. Consequently, an investor who buys shares from the primary market earns a positive return by selling them in the secondary market. In the literature, IPOs priced below their real value are called underpricing, while IPOs priced above their real value is called overpricing.

Rock (1986) argues that underpricing is the reward given to investors by firms to prevent uninformed investors from withdrawing from the market due to suffering from the winner's curse problem. According to Ritter and Beatty (1986), underpricing is the compensation demanded by uninformed investors for the costs they incur in order to learn the real value of the IPO.

The uncertainty faced by an investor submitting a purchase order in the initial public offerings about the share's real value is called "ex-ante uncertainty" (Ritter & Beatty, 1986: 213). If the uncertainty

about the IPOs real value increases, the investor's cost of accessing information increases. Underpricing is implemented to mitigate the winner's curse problem and to achieve adequate demand levels. Ritter (1985) stated that higher ex-ante uncertainty exacerbates the winner's curse problem, causing underpricing. To avoid the risk of failure for the underwriter, who keeps the price particularly low, reasons such as information asymmetry, uncertainty about the firm, and the desire of firms to generate high demand in possible secondary public offerings contribute to underpricing.

The majority of the Turkish and international studies related to IPOs have reported that IPOs are underpriced. Accordingly, investors who buy stocks from the primary market can realize returns exceeding the market average by selling them in the secondary market during the initial days following the public offering. Studies on initial public offerings show that the high returns caused by underpricing in the first days are not realized in the medium and long term.

This study aims to investigate whether there is underpricing in the stock prices of companies that realized their IPOs on BIST between 2010 and May 2022, the short-term performances of these stocks, the impact of ex-ante uncertainty on underpricing and short-term performance, the presence of a hot issue market, and whether there are differences in underpricing and short-term performances according to sectors. The paper seeks to enhance the existence literature on the phenomenon of overpricing or underpricing in IPOs on BIST by analyzing the determinants of this phenomenon using up-to-date data over a period of 12.5 years.

This paper is structured as follows: Section 2 consists of related literature. Section 3 describes the data used in empirical tests. Section 4 includes the event study methodology and regression models used in this study. In section 5, the empirical evidence is presented, and results are interpreted. Section 6 consists of a summary and concluding remarks.

The contributions of this study to the literature are stated in the conclusion section.

2. Related Literature

Beatty and Ritter (1986) investigates 1,028 IPOs offered in the USA during the period of 1977-1982. Measuring the impact of ex-ante uncertainty on underpricing, total sales amount before public offering, total proceeds, age of the company proxies are analyzed and reports that these proxies affect underpricing. The results show that the underwriters' market values that made underpricing too high or too low decrease in the next period.

Ritter (1991) investigates 1,526 stocks that were listed on the New York Stock Exchange between 1975 and 1984, finding that the average initial return was 14.3% and that the performance is positive until the second month and declines after the second month. When the companies' 3-year performances are evaluated, the findings indicate that the long-term performances of the young firms that listed on the stock market in high volume years are low. Older and larger firms do not go public in high IPO volume years, and their performance does not decrease much in the long run.

Ritter (1998) examines 190 operating companies that conducted IPOs in the USA between 1992 and 1993. He discusses the IPO valuation, book building, price stabilization, and going public costs. Short-run underpricing, hot issue markets, and long-run underperformance patterns are also analyzed. Among the factors that affect underpricing, earning per share before the issue, earning per share ratio after the issue, total proceeds, price earnings ratio proxies are analyzed, and the results show that the price-earnings ratio has explanatory power.

Levis (1993) examines the returns of 712 IPOs in London from 1980 to 1988, discovering that their average returns on the first trading day were 14.30%

Levis, Thomas (1994) examine the shares of 105 investment trusts going public between 1984 and 1992 in London. The results indicate an initial return of 1.91%.

Kıymaz (1996) examines the short-term performances of 39 IPOs that went public in the finance sector in Turkey between 1990 and 1995. His findings show that the initial return for the financial institutions' sector is 15.3%, for banks and private finance institutions sub-sector is 20.9%, for insurance companies is 10%, and 18.5% for financial leasing and factoring companies. The cumulative abnormal returns for all financials are – 9.3% for five months. He also finds that proxies affecting the short-term returns are the standard deviation of 30-day returns and the average of market returns in the period between setting the IPO price and the first trading day, proceeds from the public offerings and the self-issued offerings proxies have a weak effect on underpricing.

Kıymaz (1997) examines the long-run performances of 88 industrial IPOs going public in 1990-1995 and finds an initial return of 12.2% and cumulative abnormal return of 41.33% at the end of 36 months period. It has been revealed that the public offering rate, the 30-day standard deviations of the returns, and the privatization variable, which defines the privatization of public institutions through IPO, have a statistically significant positive relationship with the 30-day returns.

Ritter (1998) investigates 190 companies that went public in the USA in 1992-1993 period. Ritter reports the factors affecting underpricing as offering price, earnings per share ratio before public offering, earnings per share ratio after public offering, total proceeds, price earnings ratio, price to sales ratio.

Houge and Loughran (1999) analyze the 5-year performances of 393 IPOs in the banking sector in the USA going public between 1983 and 1991 and report the initial return as 6.4%. They find that these IPOs cumulative abnormal return – 21.4% of five years; it is observed that banks with high market values and high loan losses during the public offering underperform in the long run.

Kıymaz (2000) studies 163 IPOs conducted between 1990 and 1996, reporting average first day return of 13.1% across all sectors, 11.7% in the manufacturing sector, 15% in the financial institutions' sector, and 17% in other sectors. It is concluded that the total assets of the company, corporate ownership structure and self-IPO that means going public offering by the underwriter belonging

to the company, the average market returns in the period between the determination of the public offering price and the first trading day are among the proxies that affect the short-term performance.

Karan and Ayden (2000) examine 70 IPOs going public between 1992 and 1995 in BİST; it is observed that the average abnormal return in the first month is 0, a statistically significant positive return is only found in the 11th month. Their findings show that there is no underpricing in the BİST in the long run.

Ritter and Welch (2002) analyze the initial return and three-year cumulative abnormal returns of 6,249 IPOs during 1980 – 2001. They find the initial return as 18.8%, and the cumulative abnormal return of 3 years as 22%.

Jaskiewicz, González, Menéndez, and Schiereck (2005) examine 153 IPOs in Germany and 43 IPOs in Spain in 1990-2000 period. They divided companies into two separate groups as a family business and a non-family business. It is reported that cumulative abnormal returns of IPOs in Germany are – 32.8% and in Spain – 36.7% for three years. Their results indicate that the company's size has a positive and the age of the company has a negative effect on the returns.

Yalçıner (2006) investigates underpricing for 93 IPOs during the period of 1997 – 2004 and finds that the initial return is 7.2%. It has been revealed that there is no statistically significant difference between the initial returns of the shares went to the public by using capital increase, shareholder sales, and both methods.

Kim et al. (2008) examine the relationship between leverage and underpricing across high-tech and low-tech IPOs. The findings indicate that, in low-tech firms, higher leverage ratios are associated with lower levels of underpricing, suggesting that debt is perceived by investors as a positive signal of firm quality. In contrast, in high-tech firms, higher leverage ratios are linked to greater underpricing, implying that investors view these firms as more risky and uncertain.

Ünlü and Ersoy (2008) investigate 112 IPOs that went public between 1990 and 2000. Their results show that underpricing is made in 75 firms' stocks and overpricing is made in 37 firms' stocks. Initial returns are found as 6.52%. It has been revealed that underpricing is more common in companies with an operating period of more than 20 years and companies using the fixed price book building method.

Bildik and Yılmaz (2008) analyze 234 IPOs during the period of 1990-2000. They report that underpricing and long-term cumulative abnormal returns are lower than previous studies. In the study, the initial market-adjusted abnormal return is 5.94%, and the long run cumulative abnormal return is – 84.5%.

Altan and Hotamış (2008) examine the underpricing phenomena in 67 firms that went public in the 2000-2006 period. Their findings show that the initial return is 6.78%, the first-week cumulative return is 1.49%, the first-month cumulative abnormal return is 6.64%, and the first three month cumulative abnormal return is 15.65%. While 48 of 67 companies have a negative cumulative

abnormal return in the first-three months, 5 of them have cumulative abnormal return less than 10%, and 19 of them have cumulative abnormal return more than 10%.

Dağlı ve Kurtaran (2008) investigates 222 IPOs going public in 1990 and 2006 and finds the first day's market-adjusted returns 15.03%. This study concludes that underwriting and sales method effects the underpricing in IPOs.

Ritter (2009) investigates phenomenon of IPO underpricing in US IPOs in 1960 – 2008. The shares of 2.661 firms between 1960 and 1969, 1.537 between 1970 and 1979, 2.380 between 1980 and 1989, 4.146 between 1990 and 1999, and 1.301 companies between 2000 and 2008 in the USA were offered to the public. The initial market-adjusted returns of these firms are found as 21.2%, 7.1%, 6.8%, 21.1%, and 24.5%, respectively. The results indicate that the average initial market-adjusted returns for 12,022 IPOs in the 1960-2008 period are 16.9%.

Sağlam and Çelik (2011) examine the short, medium, and long-term performances of 40 IPOs listed on BİST during 1993 – 2006 period. The results indicate that 31 of them underpriced on the first trading day, and 24 are underpriced on the first trading month. The effects of intermediary method, issue year and underwriter proxies on underpricing in the short term have been investigated, and it has been revealed that these proxies do not effect on underpricing.

Otlu and Ölmez (2011) conclude that the initial return of 53 stocks went public on the BİST within 5.5 years covering January 2006, June 2011 period is 6.99%.

Elmas and Amanianganeh (2013) researched on 227 companies going public in BIST during 1995-2010 period, and they indicate that underpricing is not much affected the proxies that going public methodologies for all sectors and the sales are made to foreign investors.

Kurtaran (2013) analyzes the long-term performances of stocks went public during 1994-2009 period and indicates that the initial return is 8.32%. The results show that the sector with the highest first-day return is the manufacturing industry, and underpriced IPOs have higher performance in the long run.

Song, Tan, Yi (2014) find the initial return of 948 companies went public between September 2006 and December 2011 66% and conclude that price uncertainty, underwriter reputation, and price stability activities have a positive effect on underpricing.

Yıldırım and Dursun (2016) examines the 15-day price performance of 110 IPOs in BIST between 2004 and 2014 and detected the existence of underpricing on the first day in the study. They observe that positive abnormal returns turned negative starting from the third day, and it is concluded that companies belonging to the financial institutions sector had the highest initial returns with 8.2%. The initial return of stocks whose initial public offering was carried out through joint sales and capital increase is 6.9%, the highest initial return. The results show that companies that prefer partial firm commitment underwriting have the highest first-day abnormal return of 7.7%.

Aissia and Hellara (2019) examined 254 IPOs conducted in France between 2006 and 2016. Their analysis revealed an inverse relationship between leverage ratio and first-day IPO returns. These findings suggest that higher leverage ratios are perceived by investors as indicators of increased risk, thereby leading to lower initial returns.

Kurumahmutoğlu (2019) examines the phenomenon of underpricing on 137 IPOs in BIST and conclude that underpricing is at the level of 5.33%.

Yaşar et al. (2020) investigate the presence of underpricing in 50 companies that went public for the first time between 2013 and 2018. In this context, the stock price movements within the first 30 days following the IPO are analyzed with respect to the BIST 100 Index, the market segment in which the firm was listed, and by year. According to the price performance analysis, the firms experience an average decline of approximately 14% on the first trading day, and underpricing is observed only in the year 2018. At the end of the initial 30-day period, the highest returns are recorded in the Emerging Companies Market. When compared to the BIST 100 Index, the returns of the newly listed shares are found to be lower than the index return values.

Gasymov and Makarova (2021) analyzed 1,141 IPOs conducted in BRICS countries between 2001 and 2018. The findings indicate that larger offering sizes and the involvement of reputable audit firms (such as the Big Four) are associated with lower levels of underpricing. In contrast, high GDP growth rates and listings on foreign stock exchanges tend to increase underpricing. On the other hand, IPO parameters such as the number of underwriters, the reputation of underwriters, and deviations of the offer price from the midpoint of the price range during the issuance period are found to have no significant impact on underpricing for companies in BRICS countries.

Usanmaz and Söylemez (2021) examine 189 initial public offerings conducted on Borsa İstanbul between 2000 and 2015. The study findd that the IPO method, the type of intermediation, the timing of the offering, and the market segment on which the shares were listed have no significant impact on abnormal returns in the short and medium term. The average first-day abnormal return is the highest at 5.73%; however, on average, IPO stocks underperformed the Borsa Istanbul index by 13.34% within one year following the offering. The findings also indicate that neither the method nor the timing of the IPO led to differences in post-offering performance, and the market segment in which the shares were traded did not significantly affect short – or medium-term returns.

Abbas et al. (2022) examine IPOs in the real estate sector listed on the Indonesia Stock Exchange between 2015 and 2019. The findings indicate that the financial leverage ratio (debt-to-equity ratio) does not have a statistically significant effect on underpricing. However, other financial and non-financial factors ,such as the liquidity ratio (current ratio), profitability (ROA), underwriter reputation, and the proportion of shares offered, are found to have significant impacts on the degree of underpricing.

Düzer (2022) conducts a study on 57 IPOs listed on Borsa Istanbul between 2015 and 2021 and find that the average abnormal return on the first trading day is 6.25%. In 2020, the average first-day

abnormal return exceeded 10%, while the cumulative return over the first seven trading days reached approximately 70%. The highest first-day returns are observed in the transportation sector, followed by the information technology sector.

Dias, Wijesinghe and Madhushani (2023), investigate underpricing on 68 IPOs in the Colombo Stock Exchange (CSE) between 2006-2018 period. The selected factors for the study are ASPI Return, Sector Price/Earnings ratio, Age, Earnings Per Share, Debt Ratio, Net Asset Value, Return on Asset, Price/Earnings Ratio, Debt/Equity Ratio, Offer Price, and Over Subscription Rate. Results show that ASPI return and over-subscription rate are positively, offer price is negatively effect the initial abnormal return which is 18%.

Yılmaz and Abdioğlu (2023) investigate the presence of underpricing in stocks that went public on Borsa Istanbul (BIST) between 2005 and 2020, using Market-Adjusted Returns and the Single-Factor Model (SFM). In addition, the study examines whether abnormal returns differ significantly across sectors using one-way analysis of variance (ANOVA). The analysis reveals evidence of underpricing based on both the market-adjusted abnormal return model (6.395%) and the SFM (0.00916%). A t-test comparing the abnormal returns calculated by the two models shows that the difference between them is statistically significant. However, the results indicate no significant differences in underpricing across sectors.

3. Data

This study covers all IPOs that listed and traded on BİST between January 1, 2010, and May 30, 2022. The sample includes 183 companies. In our study, we investigate the underpricing phenomenon, short-term performances, and the proxies influencing initial and 30-day cumulative abnormal returns.

The distribution of IPOs by year is as in Table 1:

Table 1: Distribution of IPOs by Year

Year	Number of IPOs
2010	22
2011	26
2012	25
2013	18
2014	11
2015	6
2016	1
2017	3
2018	9
2019	6
2020	8
2021	41
2022	5

The samples were obtained from the websites of Capital Markets Board (CMB), BİST, and Public Disclosure Platform (PDP).

Companies are grouped into three sectors: financial institutions, manufacturing, and others. Due to the low number of companies operating in sectors such as mining and quarrying, electricity, gas and water, technology, education, health, sports, and other social services, construction and public works, retail and trade, transportation, storage and telecommunication, agriculture, forestry, and fishing, professional, scientific, and technical activities, administrative and support service activities, their shares are grouped under the title of others. The sector classification is based on the leading sectors of the Public Disclosure Platform (PDP).

Table 2: Number of Firms under Other Sector Group

Sectors	Number of Firms
Information and Communication	1
Education, Health, Sports, and Other Social Services	3
Electricity, Gas, and Water	14
Administrative and Support Service Activities	6
Construction and Public Works	7
Mining	2
Professional, Scientific, and Technical Activities	4
Agriculture, Forestry, and Fishing	4
Technology	15
Wholesale and Retail Trade, Hotels, and Restaurants	18
Transportation, Communication, and Storage	7

The analysis part of this study is divided into several parts. In the first part, underpricing is investigated by calculating the initial returns of IPOs. In the second part, the factors affecting underpricing and the relationship between ex-ante uncertainty and underpricing are examined. A hot issue market refers to a market characterized by a significantly high volume of IPOs, an overwhelming demand from investors, and an unusually high level of underpricing (Küçükkocaoğlu & Kapucu, 2017: 695). The validity of the hypothesis that companies conducting IPOs in a hot issue market engage in more underpricing is being tested in the BIST. In the third part, whether the initial returns differ by sector is investigated. When the literature is examined, it is observed that abnormal returns on the first day continue in the short run. One of the research topics of this study is whether the effect of underpricing in BIST continues in the short run. In the fourth part, the short-term performances of IPOs and the factors affecting short-term performance are analyzed. Additionally, the distribution of 30-day market-adjusted returns by sectors is investigated. The short term is defined as 30 days. Simple linear and multiple linear regression analysis, Factor, and ANOVA analyses are used in the study. Factor analysis is used to eliminate variables which have high correlations between them. ANOVA analyses are conducted to examine whether the sectoral distribution of first-day market-adjusted abnormal returns differ and to investigate the presence of a hot issue market.

The analyses are conducted using the Stata/SE 12 program.

4. Methodology

The event study methodology is applied to calculate the short-term performances (30-day returns) of IPOs. The market-adjusted return method, one of the return models used in event study methods, is used to calculate the returns. According to this method, it is necessary to remove the abnormal return from the market's price movements. The abnormal return (AR) of a stock is found by subtracting the market return from the stock's raw return (Kıymaz, 1997: 48).

To analyze underpricing, raw returns, market returns, market-adjusted abnormal returns, and cumulative abnormal returns are calculated (Ritter, 1991; Aggarwal, Leal & Hernandez, 1993; Kıymaz, 1996).

The raw return for stock *i* in the period *t* is calculated as follows:

$$R_{i,t} = \frac{P_{i,t} - P_{i,t-1}}{P_{i,t-1}} \quad (1)$$

where *Pi*, *t* is the closing price of stock *i* at time *t* and Pi,t-1 is the closing price of stock i one day before time t

$$R_{i,1} = \frac{P_{i,1} - P_{i,0}}{P_{i,0}}$$

where Ri,1 is the initial raw return, Pi,1 is the closing price at the end of the first trading day of stock i, and Pi,0 is the offer price

The initial raw return is defined as the price change from the offer price to the closing price at the end of the first trading day.

Market movements influence IPO returns. To reduce the market effect on stock returns, the market-adjusted return of the stock is estimated by subtracting the market return from the raw return of the stock (Chalk & Peavy, 1987; Ritter, 1991; Kıymaz, 1996). In this method, the returns are not adjusted for systematic risk, and it is assumed that the beta (β) values of the first publicly offered stocks are equal to 1. This is because sufficient and accurate information about the companies could not be reached before the first public offering (Karan, 2000: 92). The Borsa İstanbul (BIST) All Shares Index is used as the market index in the study.

The market return:

$$R_{m,t} = \frac{P_{m,t} - P_{m,t-1}}{P_{m,t-1}} \quad (2)$$

where $P_{m,t}$ is the closing price of BIST All Shares Index at time t and $P_{m,t-1}$ is the closing price of BIST All Shares Index at time t-1

Market Adjusted Abnormal Return:

$$AR_{i,t} = R_{i,t} - R_{m,t} \quad (3)$$

where $R_{i,t}$ is the raw return of stock i at time t, $R_{m,t}$ is the market return of BIST All Shares Index at time t

Cumulative Abnormal Return:

$$CAR_T = \sum_{t=0}^{T} \mathrm{AR}_T \quad (4)$$

where CAR_T is average cumulative abnormal returns *T* days after the event date for n stocks, AR_T is the sum of average abnormal returns over that period.

Market Adjusted Daily or Monthly Average Abnormal Returns:

$$\overline{AR}_t = \frac{\sum_{i=t}^{n} AR_{it}}{n} \quad (5)$$

is calculated as in the equation.

Firstly, the 30-day market-adjusted returns are calculated to assess short term performance. A one-way t-test was conducted to determine whether the average market-adjusted returns are statistically significant or not. The hypotheses for the one-way t-test are as follows:

$$H_0 = \overline{AR}_t = 0 \quad (6)$$

$$H_1 = \overline{AR}_t > 0 \quad (7)$$

The null hypothesis (H0) states that the average abnormal returns on the first trading day of the stocks that are offered to the public for the first time are equal to 0, implying that it is not possible to obtain positive abnormal returns by investing in these stocks, and underpricing cannot occur.

The alternative hypothesis (H1), on the other hand, states that the average abnormal returns on the first trading day of the stocks that are offered to the public for the first time are greater than 0, implying that by investing in these stocks, positive abnormal returns can be obtained and underpricing can occur.

Under the assumption that the null hypothesis is correct, the t statistics are calculated as follows:

$$t_{hes} = \frac{\bar{X} - \mu}{S\bar{x}} \quad (8)$$

$\bar{x}$= sample mean

μ = the hypothesized population mean

$S\bar{x}$ = the sample standard deviation

H0 hypothesis is rejected if the t_{hes} value calculated at the α significance level exceeds the critical value of t or falls into the rejection region. In this case, it is concluded that underpricing is made and positive abnormal returns can be obtained.

4.1. Ex-ante Uncertainty Hypothesis, Factors Affecting Underpricing and Short-Term Performance

Many hypotheses have been suggested to explain the reasons for underpricing in initial public offerings (IPOs). Among these hypotheses, the ex-ante uncertainty hypothesis is one of the most empirically studied. This study utilizes the ex-ante uncertainty hypothesis to examine the factors affecting underpricing and short-term returns.

Ex-ante uncertainty refers to the uncertainty about the real value of a stock experienced by an investor who places a purchase order in an IPO (Beatty & Ritter, 1986: 213). Beatty and Ritter (1986) argue that underpricing is positively correlated with ex-ante uncertainty. Under uncertainty, investors cannot accurately predict real first-day abnormal returns, leading to the winner's curse problem. Beatty and Ritter (1986) further argues that ex-ante uncertainty exacerbates the winner's curse problem. Moreover, if investors are not certain that the IPO is not underpriced, the initial IPO market could face a lemon problem. Therefore, when the ex-ante uncertainty is high, the investor demands underpricing to earn higher returns. The company and the underwriter faced with the risk of an uninformed investor withdrawing from the market due to the ex-ante uncertainty, have to decrease the public offering price. In addition to this, the underwriter loses market share if first-day returns are not in line with ex ante uncertainty.

In the second section of the paper, we explore the factors affecting underpricing and the relationship between ex-ante uncertainty and underpricing. We use multiple linear regression models (Model 1 and Model 2) to examine the presence of ex-ante uncertainty. Additionally, we describe proxies associated with ex-ante uncertainty that affect underpricing and short-term performance.

The proxies used to investigate ex-ante uncertainty include self-IPO, public offering rate, proceeds, age, assets, liabilities, book value, earnings per share, net profit for the period, liquidity ratio, debt-to-equity ratio, leverage ratio, MV/BV ratio, market standard deviation, intermediation type, and sales method variables.

Model 1: $$AR1 = \alpha + \beta_1 Market\_STD\_30 + \beta_2 Before\_Market\_STD + \beta_3 D_{Method1} + \beta_4 D_{Method2} + \beta_5 D_{Intermediation1} + \beta_6 D_{Intermediation2} + \beta_7 D_{Selling1} + \beta_8 D_{Selling2} + \beta_9 D_{Selling3} + \beta_{10} D_{SectorFinance} + \beta_{11} D_{SectorManufacture} + \beta_{12} D_{Self\_IPO} + \beta_{13} D_{2010} + \beta_{14} D_{2011} + \beta_{15} D_{2012} + \beta_{16} D_{2013} + \beta_{17} D_{2014} + \beta_{18} D_{2015} + \beta_{19} D_{2016} + \beta_{20} D_{2017} + \beta_{21} D_{2018} + \beta_{22} D_{2019} + \beta_{23} D_{2020} + \beta_{24} D_{2021} + \beta_{25} Rate + \beta_{26} NetProceeds + \beta_{27} Price + \beta_{28} Age + \beta_{29} Assets + \beta_{30} MV/BV + \beta_{31} P/E + \beta_{32} Liquidity + \beta_{33} D/E + \beta_{34} Levarage \quad (9)$$

Model 2: $$CAR30 = \alpha + \beta_1 Market\_STD\_30 + \beta_2 Before\_Market\_STD + \beta_3 D_{Method1} + \beta_4 D_{Method2} + \beta_5 D_{Intermediation1} + \beta_6 D_{Intermediation2} + \beta_7 D_{Selling1} + \beta_8 D_{Selling2} + \beta_9 D_{Selling3} + \beta_{10} D_{SectorFinance} + \beta_{11} D_{SectorManufacture} + \beta_{12} D_{Self\_IPO} + \beta_{13} D_{2010} + \beta_{14} D_{2011} + \beta_{15} D_{2012} + \beta_{16} D_{2013} + \beta_{17} D_{2014} + \beta_{18} D_{2015} + \beta_{19} D_{2016} + \beta_{20} D_{2017} + \beta_{21} D_{2018} + \beta_{22} D_{2019} + \beta_{23} D_{2020} + \beta_{24} D_{2021} + \beta_{25} Rate + \beta_{26} NetProceeds + \beta_{27} Price + \beta_{28} Age + \beta_{29} Assets + \beta_{30} MV/BV + \beta_{31} P/E + \beta_{32} Liquidity + \beta_{33} D/E + \beta_{34} Levarage + \beta_{35} AR1 + \beta_{36} STD30 \quad (10)$$

The dependent and independent variables used in multiple linear regression analysis are as follows:

AR1: Initial return (abnormal return) of the first trading day. It is included in the analysis as both a dependent and independent variable.

CAR30: It indicates a cumulative abnormal return over 30 days. It is used as a dependent variable.

Market_STD_30: Standard deviation of market returns for 30 days after the IPO. According to Beatty, Ritter (1986) and Rock (1986), information asymmetry increases uncertainty as investors are unable to predict the future prices of shares, leading them to anticipate greater underpricing. Since the volatility in index returns following the IPO is expected to increase uncertainty, the impact of underpricing is also anticipated to influence short-term performance. It is associated with ex-post uncertainty, with higher risk expected to lead to higher returns.

Before_Market_STD: The underpricing of initial public offerings could stem from an increase in stock market values occurring between the determination of the offering price and the commencement of trading. It shows the standard deviation of the market's 30-day returns before the IPO. It is used to analyze how uncertainty affects initial returns, with higher systematic risk leading to higher uncertainty.

STD30: It shows the standard deviation of market-adjusted abnormal returns for 30 days after the IPO. Rock (1986) views underpricing as a consequence of information asymmetry between informed and uninformed investors. According to his model, the extent of underpricing is influenced by the level of uncertainty surrounding the future market price. Greater diversity in expectations leads to higher information asymmetries, which in turn result in greater underpricing. To assess the uncertainty associated with IPOs, the standard deviation of daily stock price returns over the first 30 trading days is used as a proxy. It is associated with ex-post uncertainty, with higher risk expected to lead to higher returns.

Method: It represents the method of going public. The sales proceeds obtained in public offerings made by the capital increase method are used for company growth, leading to lower uncertainty compared to public offerings through joint sales. In the joint sales method, proceeds go to the existing shareholders and funds may not used for the firms growth strategies. Underpricing is expected to be higher in the joint selling method. It is represented as a dummy variable with three levels: D_Method1 for Joint Sale, D_Method2 for Capital Increase, and D_Method3 for Capital Increase and Joint Sale.

Intermediation: This variable indicates the method of intermediation and is represented as a dummy variable with three categories:

- D_Intermediation1: Firm commitment underwriting
- D_Intermediation2: Best effort method
- D_Intermediation3: Partial firm commitment underwriting

In the firm commitment underwriting method, the underwriter guarantees to purchase the entire unsold portion of the shares at their full price in cash at the end of the sales period. For this reason, the underwriter tends to apply more underpricing to minimize the risk of unsold shares. Additionally, if it does not engage in underpricing, it faces the risks of losing market share and diminishing its reputation in the market. In full or partial firm underwriting commitment, it is expected that underwriters will underprice more because it carries more risk than the best effort intermediation method.

Selling: This variable shows the method by which public offering shares are sold. Loughran, Ritter, and Rydqvist (1994) indicate that underpricing is more pronounced in the fixed-price book building method. Chowdhry and Sherman (1996) document that the fixed-price book building method causes more underpricing than the book building with a price range method due to two features: first, the length of the bidding process leads to "price information leaks" due to the time interval between receiving offers and the first day of the public offering; second, in this method, investors are required to pay the full amount for the stock upfront as specified.

The selling variable is represented as a dummy variable with four categories:

- D_Selling1: Book building at a variable price in the primary market
- D_Selling2: Fixed price method in the primary market
- D_Selling3: Book building with a price range
- D_Selling4: Fixed price book building method

Self_IPO: This variable represents whether the public offering is carried out by the company itself or its group companies. In the literature, a public offering made from their own companies is termed a self-offered IPO. If the public offering is made from their own companies, underpricing is expected to be less, since there will be no information asymmetry between the underwriter and the company performing the public offering. According to Baron (1982), underwriters are more informed than the firms conducting the initial public offering. Underwriters may engage in excessive underpricing to minimize their effort in selling shares and to ensure the sale of all shares, thereby maximizing their profits. Furthermore, the inability of underwriters to sell a sufficient number of shares in an IPO can harm their reputation. However, in cases where the firm conducts its IPO through its own underwriter or investment bank, it is believed that there is no significant information asymmetry, reducing the need for excessive underpricing. It is employed as a dummy variable, taking the value 1 if the public offering is made from its own company or group companies, and 0 otherwise.

Year: This variable indicates the year in which the public offering took place. It is used to analyze how the hot and cold IPO market affects initial returns. Ibbotson and Jaffe (1975), Ritter (1984), Helwege and Liang (2001), and Brownhilder and Smith (2013) suggest that underpricing is higher in hot markets. It is represented as a dummy variable, divided into 13 categories (D2010 to D2022).

Sector: This variable indicates the sector of the public offering company. It is represented as a dummy variable, divided into three categories: D_Finance, D_Manufacture, and D_Other.

Rate (Public Offering Ratio): This variable indicates the percentage of equity offered to the public. According to Leland and Pyle (1977), the percentage of shares retained by the firm after the initial public offering serves as a signal to investors. A company retaining a low percentage of shares sends a negative signal to investors Keasey and Short (1992) suggest that if the public offering rate is high, meaning that the company owners have a low share after the public offering, investors may perceive lower trust in the company, increasing uncertainty and potentially giving negative signals to investors about the company.

Proceeds: It represents gross proceeds obtained from the public offering. Lower gross proceeds are expected to increase uncertainty, as they may signal negatively about the company. Ritter (1986) argues that smaller firms are more speculative. As a result, a negative correlation between gross proceeds and underpricing is anticipated.

Price: It refers to the offering price of an IPO.

Age: This variable indicates the operating period of the company. It is generally easier to access information about companies with longer operating histories than those with shorter ones. Additionally, companies with longer operating histories tend to have greater reputation and reliability, as they have proven themselves in the market over time. Such companies also tend to have more accurate financial forecasts due to their deeper knowledge and experience in their respective sectors. In other words, the risk associated with companies with shorter operating periods is higher than that of companies with longer operating periods due to the former's higher level of uncertainty. Ritter (1986) reported that companies with shorter operating periods tend to underprice more in order to attract investors. Therefore, a negative relationship is expected between a company's operating life and underpricing.

Assets: This variable represents the total asset value of the company. Companies with smaller total assets are considered to be more speculative and face greater difficulties in raising funds compared to companies with larger assets. Therefore, companies with smaller total assets are expected to underprice more in initial public offerings. A negative correlation is expected between underpricing and the company's total assets.

S_Liabilities (Short-Term Liabilities): It reflects the company's short-term liabilities. Since companies with higher liabilities are perceived to be more uncertain, they are expected to experience higher levels of underpricing. Therefore, a positive relationship is expected between this variable and underpricing.

Book Value: This proxy represents the book value of the company. Companies with higher book values are perceived to be less uncertain. Therefore, they are expected to experience less underpricing. A negative correlation is expected between this proxy and underpricing.

MV/BV (Market Value/Book Value): This ratio indicates whether a company is priced lower or higher than its book value in the market. A low ratio suggests that the company is priced lower than its actual value in the market, leading to higher underpricing and increased uncertainty about the company.

Cost: It indicates the public offering cost.

Inventory: This variable shows the quantity of inventory held by the company.

Current Assets: A positive relationship is expected between current assets and underpricing, assuming that companies with high current assets are perceived to have lower risk.

EPS (Earnings Per Share): This ratio indicates the earnings per share of the company. Companies with higher EPS ratios are perceived to have lower uncertainty, leading to less frequent underpricing. A negative correlation is expected between this proxy and underpricing.

P/E (Price-Earnings) Ratio: This ratio is used to assess whether the offering price of an IPO is overvalued or undervalued relative to the company's earnings.

Profit: This variable shows the profit for the period. Higher net profit reduces investors' perception of uncertainty about the company, leading to lower demand for underpricing. A negative correlation is expected between this proxy and underpricing.

Liquidity: It represents the liquidity ratio. A high liquidity ratio indicates that the company has a high ability to pay its short-term debts. Therefore, underpricing is expected to be less common because uncertainty about the company decreases. A negative correlation is expected between this proxy and underpricing.

D/E (Debt-to-Equity) Ratio: This ratio reflects the balance between debt and equity in a company's capital structure. A high D/E ratio suggests that the company relies more on borrowing for financing, which can increase uncertainty and, consequently, underpricing. A positive relationship is expected between this variable and underpricing.

Leverage Ratio: It shows the leverage ratio, which indicates the percentage of assets covered by external funds. Investors are expected to demand more underpricing as the leverage ratio increases, as it implies a higher payment risk. A positive relationship is expected between this variable and underpricing.

In the third part of the study, to investigate the existence of a hot issue market, years with first-day returns above, below, and equal to the average were divided into three groups based on confidence intervals. The study examines whether there is a statistically significant difference between the averages of the three groups using ANOVA analysis. Additionally, ANOVA analysis is used to investigate whether first-day and short-term returns vary across sectors.

4.2. Correlation Matrix and Factor Analyzes

Factor analysis is a data analysis technique used to explain the relationship between variables, reduce data, classify and redefine data, transform data, and validate hypotheses. (Rummel, 1970: 102). In order to obtain a smaller number of meaningful variables that share common variance and have high correlation from a larger number of variables, Exploratory Factor Analysis (EFA) has been applied in this study.

When variables within a factor have similar correlation coefficients, it can be challenging to explain the meaning of this factor. The rotation process is used to eliminate or reduce such problems. As a result of this process, some correlation coefficients increase while others decrease, and median values decrease. Consequently, the meanings of the factors become clearer. (Rummel, 1970: 102). Varimax rotation minimizes the number of variables with high loadings on each factor and aims to make small loadings even smaller. (Gorsuch, 1983). The correlation matrix of the proxies is provided in Table 3. The factors with eigenvalue are represented in Table 4. The results of the factor analysis after the rotation process are presented in Table 5.

When examining the correlation matrix, it is observed that there is a correlation higher than 0,50 between the gross proceeds obtained from the IPO and the nominal number of shares offered, assets, liabilities, capital before issuance, IPO cost, current assets, and current liabilities. Furthermore, correlations higher than 0,50 are observed between the number of shares offered and equity and capital before issuance, assets and liabilities, assets and equity, equity and IPO cost, liabilities and current liabilities, current assets and current liabilities, and IPO cost, equity and capital before issuance, net income and earnings per share, current liabilities and current assets, total proceeds and number of shares, assets, liabilities, capital before issuance, IPO cost, current assets, and current liabilities proxies.

The Kaiser criterion is one of the criteria used to determine the number of factors to retain. This criterion suggests retaining all factors with an eigenvalue greater than 1 (Kaiser, 1960). The first five factors have been selected because their eigenvalues are greater than 1. Among these factors, variables with factor loadings of 0,5 and above were chosen. Hair et al. (1998) suggest that variables with factor loadings of 0,5 and above are crucial in determining the minimum loading required to form a factor.

Since book value is used in the denominator of the MV / BV variable, the BookValue variable has been excluded from the analysis. Inventory, current assets, and current liabilities are values used to calculate the liquidity ratio. Therefore, they were not included in the analysis. Earnings per share ratio is composed of Capital Before Issuance and Net Period Profit variables, and since earnings per share is in the denominator of the price-earnings ratio, it was excluded from the analysis.

Taking into account the correlation between Proceeds and Cost variables, the IPO cost was adjusted by subtracting the IPO proceeds, and the Net Proceeds variable was included in the analysis.

Table 3: Correlation Matrix

Proxies	Public Offering Ratio	Public Offering Price	Age	Total Proceeds	Number of Shares	Assets	Liabilities	Equity	Capital Before Issuance	IPO Cost	Net Period Profit	Earnings Per Share
Public Offering Ratio	1											
Public Offering Price	0.11	1										
Age	0.04	0.09	1									
Total Proceeds	0.04	0.35	-0.005	1								
Number of Shares	-0.004	-0.06	0.01	0.62	1							
Assets	0.06	0.28	-0.02	0.59	0.38	1						
Liabilities	0.01	0.34	0.01	0.52	0.16	0.88	1					
Equity	0.10	0.09	-0.058	0.45	0.53	0.76	0.37	1				
Capital Before Issuance	-0.002	-0.05	0.0006	0.63	0.97	0.44	0.19	0.59	1			
IPO Cost	0.03	0.44	0.04	0.75	0.41	0.54	0.50	0.38	0.43	1		
Net Income/ Net Loss	0.28	0.19	-0.07	0.26	0.05	0.26	0.07	0.42	0.07	0.05	1	
Earnings Per Share	0.24	0.44	0.01	0.18	-0.02	0.18	0.10	0.23	-0.01	0.17	0.52	1
Price/Earnings Ratio	-0.03	-0.006	0.04	-0.006	0.02	-0.04	-0.04	-0.04	0.02	-0.007	-0.02	-0.08
Current Assets	0.07	0.35	0.08	0.51	0.13	0.51	0.55	0.25	0.14	0.35	0.22	0.29
Current Liabilities	0.005	0.21	0.04	0.66	0.22	0.47	0.64	0.05	0.20	0.44	0.04	0.09
Liquidity Ratio	-0.02	-0.07	-0.14	-0.05	-0.03	-0.03	-0.04	-0.01	-0.04	-0.06	-0.004	0.05
MV/BV	-0.02	0.10	-0.02	0.26	0.05	-0.03	-0.03	-0.03	0.04	0.29	-0.01	-0.14
Debt/Equity Ratio	-0.02	0.14	-0.04	0.003	-0.04	0.10	0.18	-0.04	-0.04	0.02	-0.03	-0.04
Leverage Ratio	0.01	0.19	0.08	0.23	-0.02	0.14	0.38	-0.25	-0.04	0.24	-0.18	-0.11

Table 3: Correlation Matrix (Continue)

Proxies	Price/Earnings Ratio	Current Assets	Current Liabilities	Liquidity Ratio	MV/BV	Debt/Equity Ratio	Leverage Ratio
Price/Earnings Ratio	1						
Current Assets	-0.08	1					
Current Liabilities	-0.06	0.74	1				
Liquidity Ratio	-0.02	-0.04	-0.06	1			
MV/BV	0.10	-0.04	-0.03	-0.01	1		
Debt/Equity Ratio	-0.01	0.10	0.04	-0.04	0.17	1	
Leverage Ratio	0.03	0.30	0.49	-0.30	0.14	0.38	1

Table 4: Factor Analysis Rotation: Orthogonal Varimax (Kaiser Off)

Factor	Variance	Difference	Rate	Cumulative
Factor1	3,20*	1,33	0,32	0,32
Factor2	1,86*	0,09	0,18	0,51
Factor3	1,77*	0,32	0,18	0,69
Factor4	1,44*	0,44	0,14	0,84
Factor5	1,001*	0,50	0,101	0,94
Factor6	0,49	0,15	0,05	0,99
Factor7	0,33	0,01	0,03	1,02
Factor8	0,32	0,21	0,03	1,06
Factor9	0,101	0,09	0,01	1,07
Factor10	0,011	0	0,001	1,07

*Note: * represents factors with an eigenvalue greater than 1.*

Table 5: Variables And Their Factor Loadings Grouped Under The Same Factor After The Rotation Process

Proxies	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8	Factor 9	Factor 10
Public Offering Ratio	0,14	-0,08	-0,13	0,04	0,08	-0,18	-0,006	0,43	-0,01	0,01
Earnings Per Share	-0,001	0,02	0,04	0,77*	-0,11	-0,11	0,06	0,005	-0,02	0,008
Price/Earnings Ratio	-0,02	0,07	-0,12	-0,05	0,09	0,05	0,01	-0,29	-0,10	0,07
Liquidity Ratio	-0,01	-0,03	-0,03	0,06	-0,01	-0,48	0,008	0,10	-0,01	0,01
MV/BV	-0,03	0,23	-0,04	-0,08	0,79*	0,02	0,05	0,003	0,0008	-0,001
Debt/Equity Ratio	-0,03	-0,06	0,39	-0,02	0,19	0,13	0,43	0,002	-0,01	-0,003
Leverage Ratio	0,45	0,12	0,38	-0,16	0,16	0,42	0,26	-0,06	-0,01	0,02
Assets	0,13	0,16	0,72*	0,13	0,002	0,03	0,0002	-0,04	-0,09	0,03
Total Proceeds	0,57	0,68*	0,13	0,05	0,30	0,01	0,01	0,07	-0,004	0,01
Equity	-0,85*	-0,01	0,13	0,30	-0,02	0,04	-0,17	-0,009	0,17	-0,02
CapitalBefore Issuance	0,001	0,82*	-0,004	-0,03	-0,08	0,01	0,04	-0,10	0,03	-0,02
Net Period Profit	-0,34	0,01	0,04	0,81*	0,02	0,04	-0,07	0,01	0,02	-0,006
Current Assets	0,46	0,16	0,75*	0,02	-0,04	0,02	0,05	0,01	0,10	-0,03
Inventories	0,81*	0,14	0,24	-0,01	-0,02	0,08	-0,13	0,06	0,18	0,02
Current Liabilities	0,89*	0,17	0,33	-0,06	-0,02	0,01	-0,05	-0,02	0,01	-0,03
IPO Cost	0,28	0,72	0,34	0,06	0,41	0,02	-0,09	0,05	-0,04	0,02

*Note: * represents variables with factor loadings of 0.05 and above.*

5. Empirical Results

In the study, firstly, the 30-day raw returns of the stocks were calculated according to equation 1. In order to calculate the market-adjusted returns of the stocks, index returns were calculated using equation 2, and then market-adjusted daily returns were calculated using equation 3. The 30-day average abnormal returns calculated according to equation 4 are presented in Table 6.

Table 6: 30-Day Market Adjusted Abnormal Returns

Abnormal Return (AR)	Mean	Std. Dev.	T	P Ha:Avg.!= 0	P Ha: Avg.> 0
AR_1	0,055	0,08	8,62	0,00*	0,00*
AR_2	0,034	0,07	5,92	0,00*	0,00*
AR_3	0,0244	0,07	4,50	0,00*	0,00*
AR_4	0,0084	0,07	1,47	0,14	0,07
AR_5	0,0106	0,05	1,78	0,009*	0,004*
AR_6	0,0100	0,07	1,08	0,07	0,03
AR_7	-0,0007	0,04	-0,21	0,82	0,58
AR_8	0,0001	0,05	0,03	0,97	0,48
AR_9	0,0049	0,04	1,41	0,15	0,07
AR_10	-0,0066	0,05	-1,58	0,11	0,94
AR_11	0,0002	0,04	0,08	0,93	0,46
AR_12	0,0049	0,05	1,25	0,21	0,10
AR_13	0,0070	0,04	2,08	0,03**	0,01**
AR_14	0,0041	0,04	1,37	0,17	0,08
AR_15	0,0316	0,27	1,56	0,11	0,05
AR_16	0,0053	0,04	1,74	0,08	0,04
AR_17	0,0013	0,03	0,54	0,58	0,29
AR_18	0,0037	0,03	1,43	0,15	0,07
AR_19	-0,0018	0,03	-0,64	0,51	0,74
AR_20	0,0018	0,04	0,59	0,55	0,27
AR_21	-0,00009	0,04	-0,02	0,97	0,51
AR_22	-0,0019	0,03	-0,67	0,50	0,74
AR_23	-0,0018	0,04	-0,60	0,54	0,72
AR_24	0,0035	0,03	1,33	0,18	0,09
AR_25	0,0026	0,03	1,16	0,24	0,12
AR_26	-0,0036	0,03	-1,54	0,12	0,93
AR_27	-0,0020	0,03	-0,84	0,40	0,79
AR_28	0,0034	0,03	1,39	0,16	0,08
AR_29	0,0017	0,02	0,79	0,42	0,21
AR_30	-0,0008	0,03	-0,35	0,72	0,63

*Note: *, ** represent statistical significance at the, 1%, and 5% levels, respectively.*

The highest average abnormal return was observed on the 1st day. A decrease in average abnormal returns was observed from the 2nd day onwards. While the average abnormal returns were positive for the first 6 days, they turned negative from the 7th day onwards. Out of 183 stocks, 125 had positive returns on the first day, which decreased to 101 on the 2nd day, 86 on the 3rd day, and 82 on the 4th day.

According to the T-test results, the daily abnormal returns on the 1st, 2nd, 3rd, 5th, and 13th days were statistically different from zero. Therefore, the null hypothesis (H0) stating that the returns on the first day were zero and there was no underpricing was rejected, indicating that there was

underpricing. The average abnormal return on the first day was found to be 0.05. Returns on the 6th, 8th, 9th, 11th, 12th, 14th, 15th, 16th, 17th, 18th, 20th, 24th, 25th, 28th, and 29th days were positive but not statistically significant.

A one-sample t-test was conducted at the 0,05 significance level to test the statistical significance of the cumulative abnormal returns. The t-test results are presented in Table 7.

Table 7: Car 30 Cumulative Daily Market Adjusted Abnormal Returns

Cumulative Abnormal Returns (CAR)	Mean	Std. Dev.	T	P Ha:Avg.!= 0	P Ha: Avg. > 0
CAR1	0,0550	0,0862	8,62	0,00	0,00
CAR2	0,0890	0,1396	8,62	0,00	0,00
CAR3	0,1135	0,1914	8,02	0,00	0,00
CAR4	0,1220	0,2071	7,96	0,00	0,00
CAR5	0,1326	0,2247	7,98	0,00	0,00
CAR6	0,1427	0,2508	7,69	0,00	0,00
CAR7	0,1419	0,2605	7,36	0,00	0,00
CAR8	0,1421	0,2648	7,25	0,00	0,00
CAR9	0,1470	0,2721	7,30	0,00	0,00
CAR10	0,1403	0,2778	6,83	0,00	0,00
CAR11	0,1406	0,2863	6,64	0,00	0,00
CAR12	0,1077	0,2819	5,16	0,00	0,00
CAR13	0,1526	0,3070	6,72	0,00	0,00
CAR14	0,1568	0,3119	6,80	0,00	0,00
CAR15	0,1884	0,4215	6,04	0,00	0,00
CAR16	0,1938	0,4206	6,23	0,00	0,00
CAR17	0,1951	0,4291	6,15	0,00	0,00
CAR18	0,1989	0,4396	6,12	0,00	0,00
CAR19	0,1970	0,4305	6,19	0,00	0,00
CAR20	0,1988	0,4441	6,05	0,00	0,00
CAR21	0,1988	0,4357	6,17	0,00	0,00
CAR22	0,1968	0,4447	5,98	0,00	0,00
CAR23	0,1950	0,4446	5,93	0,00	0,00
CAR24	0,1985	0,4523	5,93	0,00	0,00
CAR25	0,2012	0,4534	6,002	0,00	0,00
CAR26	0,1975	0,4533	5,89	0,00	0,00
CAR27	0,1955	0,4476	5,90	0,00	0,00
CAR28	0,1989	0,4533	5,93	0,00	0,00
CAR29	0,2007	0,4562	5,95	0,00	0,00
CAR30	0,1998	0,4568	5,91	0,00	0,00

Statistically significant t-values are observed for the 30-day cumulative abnormal returns. Positive returns are achieved every day. The highest cumulative abnormal return is achieved on the 25th day,

while the lowest cumulative abnormal return is achieved on the 12th day. The effect of low pricing has continued in the short term.

5.1. Analysis of Factors Affecting Underpricing

In the second part of the study, simple and multiple linear regression analyses were conducted to examine the factors affecting the initial day returns. Independent variables in the simple linear regression models (17 different models) aimed at explaining the initial day's abnormal return are listed in Table 8. All analyses in the study were conducted at a 5% significance level.

Table 8: Simple Linear Regression Models

Dependent Variable	Independent Variable	β	T	P	R^2	Adjusted R^2
AR_1	Price/Earning Ratio	2,36e-07	0,32	0,74	0,0006	-0,004
AR_1	Liquidity Ratio	0,0008	1,32	0,18	0,009	0,004
AR_1	MV/BV	-1,09e-06	-0,41	0,68	0,0009	-0,004
AR_1	Debt/Equity Ratio	-0,001	-1,94	0,054	0,02	0,01
AR_1	PublicOfferingRatio	0,0002	0,33	0,73	0,0006	-0,004
AR_1	Self_IPO	-0,0002	-0,01	0,99	0,0000	-0,005
AR_1	Log Age	0,01000	0,63	0,53	0,53	0,002
AR_1	Log OfferingPrice	-0,0009	-1,16	0,24	0,007	0,001
AR_1	Before_Market_STD	1,85	1,38	0,17	0,010	0,004
AR_1	Market_STD_30	1,15	1,06	0,29	0,006	0,0007
AR_1	Leverage Ratio	-0,060	-2,39	0,018*	0,03	0,02
AR_1	Log Assets	-0,016	-2,11	0,036*	0,03	0,02
AR_1	Log NetProceeds	-0,018	-2,02	0,045*	0,04	0,02
AR_1	dSelling 1	0,053	1,70	0,09	0,06	0,04
AR_1	dSelling 2	0,035	2,17	0,031*	0,06	0,04
AR_1	dSelling 3	-0,012	-0,61	0,54	0,06	0,04
AR_1	d2010	-0,003	-0,07	0,94	0,03	-0,03
AR_1	d2011	0,006	0,15	0,88	0,03	-0,03
AR_1	d2012	-0,018	-0,44	0,66	0,03	-0,03
AR_1	d2013	0,0005	0,01	0,99	0,03	-0,03
AR_1	d2014	-0,031	-0,68	0,49	0,03	-0,03
AR_1	d2015	-0,016	-0,32	0,75	0,03	-0,03
AR_1	d2016	-0,074	-0,78	0,43	0,03	-0,03
AR_1	d2017	-0,024	-0,39	0,70	0,03	-0,03
AR_1	d2018	0,005	0,11	0,91	0,03	-0,03
AR_1	d2019	-0,006	-0,12	0,90	0,03	-0,03
AR_1	d2020	0,040	0,81	0,41	0,03	-0,03
AR_1	d2021	-0,004	-0,11	0,91	0,03	-0,03
AR_1	dSectorFinance	-0,005	-0,34	0,73	0,0007	-0,01
AR_1	dSectorManufacture	-0,003	-0,25	0,80	0,0007	-0,01
AR_1	d Intermediation1	0,016	0,57	0,56	0,001	-0,009
AR_1	d Intermediation2	0,011	0,42	0,67	0,001	-0,009

*Note: * represents 5% significance level.*

As seen from Table 6, the β value of the leverage ratio is found to be – 0,06, indicating that a 1% increase in the leverage ratio is associated with a 0,06% decrease in the initial day's return. This finding is not consistent with the expectation that companies with higher financial risk, as indicated by the leverage ratio, would engage in more underpricing. Ritter (1986) argues that the companies under high risk category tend to have lower IPO prices compared to companies under low risk category. However, our findings suggest that the shift in risk composition does not account for the high returns observed on the first day, which is not in line with Ritter (1986).

Companies with high leverage ratios are considered speculative, leading investors to expect higher returns in exchange for the risks they take. For this reason, firms and intermediary institutions tend to apply more underpricing. However, it was observed during the study period that investors did not expect higher returns in exchange for the risks they took, and high-risk firms applied less underpricing compared to low-risk firms. Based on these findings, it can be interpreted that the risk factor did not influence investor demand, and consequently share prices. This suggests that the stock market may not be efficient, as investors may consider factors other than rational variables (or the variables included in our model) when forming their demand for shares.

Ljungqvist and Habib (2001) identify a negative relationship between leverage ratio and underpricing in their study, consistent with the findings of this study. They interprete this finding by suggesting that investors perceive higher debt levels as a signal of firm quality, leading to lower discounts during the initial public offering process.

Kim, Pukthuanthong-Le, and Walker (2008) observe a negative relationship between leverage ratio and underpricing, consistent with our the findings. In their analysis, firms were classified into high-tech and low-tech categories. The results indicate that, in low-tech firms, higher leverage ratios are associated with lower levels of underpricing, suggesting that debt is perceived by investors as a positive signal of firm quality. Conversely, in high-tech firms, higher leverage is linked to greater underpricing, implying that investors perceive these firms as more risky and uncertain.

Similar to the findings of our study, Aissia and Hellara (2019) identified a negative relationship between high leverage ratios and first-day returns. This finding is interpreted as evidence that, since high leverage is perceived by investors as a sign of increased risk, firms tend to engage in less underpricing in an effort to offset this perception. Moreover, this result is considered consistent with the financial distress cost component of the Trade-Off Theory by authors.

There is no relationship between the initial day abnormal returns and the 30-day market standard deviation before the IPO. These results indicate that market uncertainty is not taken into account by issuers and underwriters when setting IPO prices and by investors when purchasing shares. Although this result is not consistent with the ex-ante uncertainty hypothesis, it is consistent with our results.

A 1% increase in asset size leads to a 0,016% decrease in the initial day abnormal returns. This result aligns with expectation that investors will have higher confidence in companies with larger asset sizes, thus reducing the likelihood of underpricing as asset size increases.

Net proceeds change is a variable used to measure ex-ante uncertainty. A rise in proceeds is anticipated to have a negative correlation with underpricing. In our study, a 1% increase in the revenue obtained from the IPO results in a 0,018% decrease in the initial day abnormal returns. This outcome aligns with findings in the literature and indicates that investors perceive this variable positively associated with ex-ante uncertainty.

When the sales method independent variable is taken as the dummy variable with the fixed price book building method as the base category; the β value of the dummy variable for book building at a variable price method in the primary market is 0,053; the β value of the dummy variable for fixed price book building method in the primary market is 0,035; and the β value of the dummy variable for book building with a price range method is – 0,012. The constant term is 0,0348344. When looking at the p-values, only the fixed price book building method in the primary market's initial day returns is statistically different from the fixed price book building method taken as the base category. According to the model results, the initial returns for companies using the fixed price book building method is 0,0348, while for those using the fixed price book building method in the primary market, it is 0,0701. These findings aligns with the results of Loughran, Ritter, and Rydqvist (1994).

There is no effect of market volatility in the 30-day period before the IPO on the initial day returns. These findings suggest that market uncertainty does not have an effect on initial day returns, i.e., underpricing.

According to Ritter (1986), it is expected that R-squared values will be low. A high R-squared value would imply that actual initial day returns can be predicted by investors. According to the results of simple linear regression analysis, there is no relationship between expected returns, i.e., underpricing, and increasing uncertainty.

Following the simple linear regression analyses, multiple linear regression analysis was conducted to analyze the factors affecting underpricing. The results of the multiple linear regression analyses given in Table 7 are not statistically significant. According to these results, the factors used in the study were not taken into account by underwriters and companies conducting the IPO when determining the IPO price. Additionally, it is observed that investors also do not consider the factors used in the study when purchasing shares. The results of the multiple linear regression analysis are provided in Table 9.

Table 9: Multiple Linear Regression Analyses for AR1

AR1	β Value	Robust HC3 Std. Dev	T Value	P Value
PublicOfferingRatio	-0,0002	0,001	-0,21	0,83
Price/Earnings Ratio	4,73e-07	2,86e-06	0,17	0,86
Liquidity Ratio	0,0002	0,0015	0,17	0,86
MV/BV	4,82e-07	0,00006	0,01	0,99
Dept/Equity Ratio	-0,0005	0,0007	-0,82	0,41
Leverage Ratio	-0,029	0,033	-0,90	0,37
SelfIPO	0,009	0,024	0,40	0,69
Log Age	0,029	0,018	1,60	0,11
Log Assets	-0,007	0,019	-0,39	0,69

Log NetProceeds	0,003	0,023	0,15	0,88
Log OfferingPrice	-0,019	0,028	-0,68	0,49
Before_Market_STD	1,85	1,39	1,33	0,18
dSectorManufacture	-0,021	0,016	-1,26	0,21
dSectorFinance	-0,006	0,02	-0,31	0,75
dMethod1	0,015	0,024	0,61	0,54
dMethod2	-0,018	0,017	-1,07	0,28
d Intermediation1	-0,017	0,027	-0,64	0,52
d Intermediation2	-0,0109	0,025	-0,42	0,67
dSelling 1	0,051	0,041	1,23	0,22
dSelling 2	0,038	0,02	1,83	0,06
dSelling 3	-0,024	0,018	-1,32	0,19
Const.	0,088	0,14	0,63	0,53

5.2. Sectoral Distribution of Underpricing and Hot Issue Market

ANOVA analyses are conducted to examine whether the sectoral distribution of first-day market-adjusted abnormal returns differ and to investigate the presence of a hot issue market.

The sectoral distribution of first-day abnormal returns and ANOVA analysis is presented in Table 10 and Table 11 respectively.

Table 10: Distribution of First-Day Abnormal Returns for Sectors under Other Sector Group

Sectors	Number of Firms	Mean of AR1	Mean of CAR30
Information and Communication	1	-0,11	0,24
Education, Health, Sports, and Other Social Services	3	0,068	0,004
Electricity, Gas, and Water	14	0,049	0,11
Administrative and Support Service Activities	6	0,034	0,11
Construction and Public Works	7	0,041	0,12
Mining	2	-0,032	-0,20
Professional, Scientific, and Technical Activities	4	0,087	0,074
Agriculture, Forestry, and Fishing	4	0,107	0,41
Technology	15	0,109	0,45
Wholesale and Retail Trade, Hotels, and Restaurants	18	0,021	-0,031
Transportation, Communication, and Storage	7	0,083	0,056

Table 11: Distribution of First-Day Abnormal Returns (AR1) by Sector – ANOVA Analysis

Sectors	Mean of AR1	Std. Dev.	Number of Firms	T	P Ha: Avg.!= 0	P Ha: Avg.> 0
Other	0,057	0,083	81	6.20	0,00	0,00
Manifacture	0,053	0,091	61	4.56	0,00	0,00
Finance	0,051	0,086	41	3.90	0,0004	0,0002
Total	**0,055**	**0,086**	**183**			
F statistics	**0,07**	**P Value**	**0,93**			

The highest first-day return is occurred in the other sector group. There are a total of 81 companies under the other category. A first-day abnormal return of 0,057 is observed in these sectors. This may

be due to the high variance in cash flows due to the diversity of their activities and the difficulty in predicting prices. Additionally, the high risk resulting from the uncertainty in the sub-categories of other sectors may have led to underpricing. While the lowest first-day abnormal return is – 0,073793, the highest return is 0,3060052. The second-highest return of 0,053 is observed in the manufacturing sector. There are a total of 61 companies in the manufacturing industry. The lowest first-day abnormal return is – 0,0872814, while the highest return is 0,2247841. The highest return of 0,051 is observed in the financial institutions sector. The most IPOs occurred in the manufacturing sector between 2010 and 2022. While the lowest first-day abnormal return in the manufacturing sector is – 0,1747334, the highest first-day abnormal return is 0,3153576. When the P values of the sectors are examined, it is concluded that the first-day returns in the other, financial, and manufacturing sectors are different from 0 at the 0,05 significance level. The Anova analysis of the first-day abnormal returns in the other, financial, and manufacturing sectors resulted in an F value of 0,07 and a p value of 0,9357. According to these results, there is no statistically significant difference in the first-day returns among the three sectors. Although these sectors are underpriced, the one-way Anova analysis results indicate that there is no difference in the levels of underpricing among them.

The hot issue market is defined as a market where there is an unusually high number of IPOs, investors show excessive demand for IPOs, and underpricing is excessive (Küçükkocaoğlu & Kapucu, 2017: 695).

In some periods, investors can be over optimistic about firms' future cash flows. During these periods, optimistic investors tend to offer higher prices for stocks than their true values. According to the window of opportunity hypothesis, firms prefer to go public when investor sentiment is positive.

In this study, the hypothesis that "the first-day abnormal returns of stocks that go public in hot issue markets are higher" is tested. Table 12 provides the distribution of first-day abnormal returns by year.

Table 12: The Distribution of First-Day Abnormal Returns By Year

Year of IPO	Mean of AR1	Std. Err.	Number of Firms	T	P Ha:Avg.!= 0	P Ha:Avg.> 0
2010	0,056	0,104	22	2.55	0,018**	0,009*
2011	0,066	0,091	26	3,70	0,001*	0,0005*
2012	0,041	0,092	26	2,26	0,032**	0,016**
2013	0,060	0,099	18	2,56	0,020**	0,010*
2014	0,028	0,081	12	1,19	0,25	0,12
2015	0,042	0,041	6	2,54	0,051	0,025
2016	-0,014	0	1			
2017	0,035	0,043	3	1,38	0,29	0,14
2018	0,065	0,133	9	1,47	0,089	0,17
2019	0,053	0,120	6	1,08	0,32	0,16
2020	0,1004	0,029	8	9.53	0.00**	0.00**
2021	0,055	0,062	41	5.62	0.00**	0.00**
2022	0,059	0,087	5	1.52	0.20	0.10
Total	0,055	0,086	183			
F statistics	0,45	**P value**	0,93			

Note: **, ** represent statistical significance at the, 1%, and 5% levels, respectively..*

The highest underpricing is reported in 2020, and the second-highest underpricing is occurred in 2011. In 2011, the IPOs of 26 companies were conducted. The lowest first-day abnormal return is – 0,014, which occurred in 2016. From the T-tests, it is found that there is underpricing in 2010, 2011, 2012, 2013, 2020, and 2021, while there is no underpricing in other years. It is concluded that although returns appeared positive in years with fewer IPOs, they are not statistically significant (different from 0) according to the T-test results. The average first-day abnormal returns in 2010-2011-2013-2018-2019-2020-2021-2022 are higher than the average of all IPOs, with only the first-day abnormal return in 2020 being above the upper bound of the confidence interval (0,042-0,067).

An ANOVA analysis has been conducted to identify the existence of a hot issue market and to examine whether first-day returns are higher in a hot issue market where more IPOs occur. The IPO volume is categorized into three groups: high, medium, and low, as indicated in Table 11. The years 2011-2012-2021, with an IPO volume above average, are classified as high; the years 2010-2013, with an IPO volume at the average, are classified as medium; and the years 2014-2015-2016-2017-2018-2019-2020-2022, with an IPO volume below average, are classified as low. There are 93 stocks in the high IPO volume group, 50 stocks in the low IPO volume group, and 40 stocks in the medium IPO volume group.

According to the results, the group with a medium IPO volume has a greater return variation. The first-day abnormal returns of the medium group, which has a high standard deviation, are higher than the other two groups, parallel to its standard deviation. When Table 11 is examined, it is observed that companies prefer to go public during periods when they benefit from the windows of opportunity approach, i.e., when the IPO volume is high. However, no statistically significant difference is found in the first-day abnormal returns among the three groups.

When the ANOVA analysis was repeated to measure the differences in first-day returns between the years 2010, 2011, 2012, and 2021 (considered as high IPO volume years) and the other years (considered as low IPO volume years), a p-value of 0,94 is obtained, indicating that there is no statistically significant difference in the first-day abnormal returns between the two groups. Consequently, no evidence is found for the existence of a hot issue market. The first-day returns of firms benefiting from the window of opportunity do not differ from those of firms going public in years with less IPO volume.

Table 13: The Effect of IPO Volume on AR1 – ANOVA Analysis

IPO Volume Groups	Mean	Std. Dev.	Frequency	F statistics	P Value
High	0,054	0,079	93	0,04	0,96
Medium	0,058	0,101	40		
Low	0,053	0,086	50		
IPO Volume Groups	**Mean**	**Std. Dev**	**Frequency**	**F statistics**	**P Value**
High	0,054	0,084	115	0,00	0,94
Low	0,055	0,089	68		

The null hypothesis H0, which claims no difference in the initial day returns between groups, has been accepted. In other words, the hypothesis that there is more underpricing in the hot issue market has not been accepted. These findings align with the results of Ibbotson and Jaffe (1975).

5.3. Analysis of Factors Affecting Short-Term Returns

The results of the multiple linear regression analysis (Model 2) to identify factors affecting the 30-day cumulative abnormal returns are presented in Table 14.

Table 14: Multiple Linear Regression Analysis for CAR30

Dependent Variable	Independent Variables	β	T	P
CAR30	AR1	1,52	5,27	0,00*
CAR30	PublicOfferingRatio	-0,006	-1,61	0,10
CAR30	STD30	5,55	9,17	0,00*
CAR30	Market_STD_30	6,97	1,29	0,19
CAR30	Before_Market_STD	-10,90	-2,37	0,019**
CAR30	Price/Earnings Ratio	-4,33e-07	-0,13	0,89
CAR30	Liquidity Ratio	0,025	8,69	0,00*
CAR30	MV/BV	0,00001	0,95	0,34
CAR30	Dept/Equity Ratio	0,001	0,52	0,60
CAR30	Leverage Ratio	0,005	0,04	0,96
CAR30	SelfIPO	0,15	1,48	0,14
CAR30	Log Age	-0,027	-0,39	0,69
CAR30	Log Assets	0,042	0,73	0,46
CAR30	Log NetProceeds	-0,09	-1,09	0,27
CAR30	Log OfferingPrice	0,03	0,33	0,73
CAR30	D_2010	-0,056	-0,26	0,79
CAR30	D_2011	-0,053	-0,25	0,80
CAR30	D_2012	-0,24	-1,09	0,27
CAR30	D_2013	-0,091	-0,40	0,68
CAR30	D_2014	-0,24	-1,05	0,29
CAR30	D_2015	0,32	1,24	0,21
CAR30	D_2016	-0,19	-0,51	0,61
CAR30	D_2017	0,015	0,06	0,95
CAR30	D_2018	-0,15	-0,65	0,51
CAR30	D_2019	-0,207	-0,90	0,36
CAR30	D_2020	0,47	2,20	0,029**
CAR30	D_2021	0,18	1,09	0,27
CAR30	D_Method1	0,037	0,46	0,64
CAR30	D_Method2	0,042	0,74	0,46
CAR30	D_Intermediation1	-0,17	-1,32	0,18
CAR30	D_ Intermediation2	-0,16	-2,00	0,24
CAR30	D_Selling1	-0,24	-1,75	0,082
CAR30	D_Selling2	0,042	0,53	0,60
CAR30	D_Selling3	-0,095	-0,97	0,33
CAR30	D_SectorManufacture	0,13	2,28	0,22
CAR30	D_SectorFinance	-0,073	-0,97	0,33
Prob>F=0,0000	**F(36,146)=10,81**	**R^2 =0,77**		

Note: **, ** represent statistical significance at the, 1%, and 5% levels, respectively..*

Statistically significant relationships have been found between the independent variables AR1, STD_30, Before_Market_STD, Liquidity Ratio, D_2020, and the dependent variable CAR30. The model is found to be statistically significant at the 5% significance level. The β value of the AR1 independent variable is 1,52. It has been observed that a 1% increase in abnormal returns on the first day leads to a 1,52% increase in 30-day cumulative abnormal returns.

These findings indicate that initial return (abnormal return) of the first trading day, standard deviation of market returns for 30 days after the IPO, the underpricing of initial public offerings could stem from an increase in stock market values occurring between the determination of the offering price It means that there are significant relationships between and the commencement of trading, Liquidity, and cumulative abnormal return over 30 days after the IPO.

Companies with higher first-day returns have also been found to have higher returns in the short term. The β value of the STD_30 independent variable is 5,55. A 1% increase in the standard deviation of returns results in a 5,55% increase in CAR30. This finding supports the proposition that higher volatility (risk) will increase the expected return of the investment.

The Liquidity Ratio independent variable has a β value of 0,025. The Before_Market_STD variable measures market return volatility in the 30 days before the IPO. According to the analysis, a 1% increase in the Before_Market_STD variable leads to a 10,90% decrease in CAR30. The increased volatility in the market before the IPO has negatively affected short-term returns. It has been observed that investors exhibit a risk-averse behavior towards systematic risk. It has also been concluded that the first-day abnormal returns are not affected by the volatility in the market before the IPO. When the dummy variable D_2022 is taken as the base category, it is seen that the 30-day market-adjusted cumulative abnormal returns of 2020 are 0,47 higher compared to 2022.

A negative relationship is expected between liquidity ratio and underpricing because companies with high liquidity ratios are expected to have low risk and therefore less underpricing due to their ability to pay short-term debts. It is expected that their returns will be close to zero. According to the results, a 1% increase in the liquidity ratio is accompanied by a 0,02% increase in CAR30. Contrary to expectations, it has been observed that companies with high liquidity ratios, i.e., low ex-ante uncertainty, have higher returns in the short term. There is no statistically significant relationship found between the liquidity ratio and first-day abnormal returns. We do not have evidence that companies with higher or lower liquidity ratios have more underpricing. These results can be interpreted as investors exhibiting a risk-averse attitude by investing more in companies with high liquidity ratios in the 30-day period.

In his study, Rock (1986) concludes that the higher the company's risk, the higher its first-day returns. This is because as uncertainty increases, it becomes more difficult to determine the price of IPOs. To observe the relationship between 30-day market-adjusted cumulative abnormal returns and risk, the standard deviation of post-IPO 30-day returns is divided into three groups based on confidence intervals, as in Ritter's (1986) study. Distribution of standard deviations of 30-days cumulative abnormal returns is given in Table 15. Companies with an STD30 value between 0 and 0,037 are

classified as low risk, those between 0,038 and 0,053 as medium risk, and those between 0,054 and the maximum value as high risk.

Table 15: Distribution of Standard Deviations of 30-Day Cumulative Abnormal Returns

Variable	Std. Dev.	Mean	Min.	Max.	%95 Confidence Interval
STD30	0,053	0,045	0,009	0,58	0,037 – 0,053

Table 16: Standard Deviation Categories for 30-Day Cumulative Abnormal Returns

CAR30	Mean	Std. Dev.	Frequency
Low	-0,016	0,1901	95
Medium	0,13	0,1933	33
High	0,61	0,60	55
F Value: 51,75	P Value: 0,00*		

*Note: * represents statistically significance at 1% level.*

Table 17: Bonferroni Test Results

STD30	Low	Medium
Medium	0,15	
P Value	0,11	———————
High	0,62	0,47
P Value	0,00*	0,00*

*Note: * represents statistically significance at 1% level.*

Table 16 and Table 17 show that the 30-day cumulative abnormal returns of IPOs in the high-risk category are higher than those of firms in the low and medium-risk categories. It has been concluded that the 30-day returns of stocks in the high-risk category are 47% higher than those in the medium-risk category and 62% higher than those in the low-risk category. These results are consistent with the findings of Ritter (1986) and Rock (1986).

The relationships between the variables that are the subject of our research have been determined and reported. The findings of our research, since it is related to issues such as return, risk and liquidity, which are the basic subjects of finance theory, unless there is a special requirement worth additional interpretation; we avoided making comments that we thought would not provide marginal benefit.

6. Discussion

This study delves into the multifaceted relationships between key financial variables and the short-term performance of initial public offerings (IPOs) on the Borsa Istanbul (BIST), offering an in-depth analysis of the empirical findings.

The research uncovers an intriguing inverse relationship: a 1% increase in a company's leverage ratio is associated with a 0,06% decrease in its first-day abnormal returns.

Table 18: Statics of Leverage Ratio

Variable	Obs	Mean	Std. Err.	95% Conf. Interval
LeverageRatio	183	0,51	0,18	0,47-0,55

Based on the confidence interval ranges provided in Table 18, the leverage ratio independent variable was divided into three groups: low, medium, and high. An ANOVA analysis was conducted to test whether there are differences in offering prices among these groups.

Table 19: Leverage Ratio Categories for Offering Price

LeverageRatio Groups	Mean	Std. Dev.	Frequency
Low	6,24	6,77	77
Medium	7,20	9,08	23
High	8,76	8,44	83
F Value: 2,08	P Value: 0,12		

As seen in Table 19 An Analysis of Variance (ANOVA) showed no statistically significant differences in offering prices across low, medium, and high leverage groups. This finding challenges the ex-ante uncertainty hypothesis put forth by Beatty and Ritter (1986) and Rock (1986), which posits that higher leverage – indicative of greater financial risk – should lead to more significant underpricing to compensate investors for the added uncertainty.

One potential reason for this inverse relationship is that companies with higher leverage might be setting more aggressive (higher) offering prices. This could be a strategic move to maximize capital raised, but it inadvertently limits the potential for substantial first-day gains. Alternatively, investors may view high-leverage firms with skepticism, perceiving them as financially strained or overvalued, which reduces demand and, consequently, lowers first-day returns. These results suggest that, within the Borsa Istanbul, the leverage ratio is not a reliable predictor of IPO underpricing. This challenges traditional information asymmetry explanations and implies that market sentiment, firm reputation, or other signaling mechanisms may play a more critical role in shaping investor perceptions and IPO outcomes.

The study reveals that post-IPO market volatility (STD_{30}) has a positive and statistically significant impact on 30-day cumulative abnormal returns (CAR_{30}) ($\beta = 5{,}55$, $p < 0{,}01$). Conversely, pre-IPO market volatility exhibits a negative and significant effect ($\beta = -10{,}90$, $p < 0{,}05$). This is in line with Beatty and Ritter's (1986) argument that higher volatility reflects greater ex-ante uncertainty, leading to increased underpricing. Rock (1986) similarly suggests that post-IPO volatility indicates information asymmetry between informed and uninformed investors, explaining higher volatility correlates with greater returns.

The positive impact of post-IPO volatility on CAR_{30} can be attributed to the market's reaction to new information and price discovery processes after the IPO. Higher volatility may attract speculative trading, increasing the potential for abnormal returns. However, the negative relationship between pre-IPO volatility and short-term returns suggests that investors may penalize firms perceived as riskier before going public. This risk-averse behavior underscores the importance of market timing; firms may benefit from delaying their IPO until market conditions stabilize. These findings emphasize that while post-IPO volatility can create opportunities for short-term gains, excessive pre-IPO volatility can deter investors.

The liquidity ratio positively influences 30-day cumulative abnormal returns ($\beta = 0{,}025$, $p < 0{,}00$). This aligns with Amihud and Mendelson's (1986) findings that higher liquidity reduces transaction costs, making a stock more attractive. Ritter (1991) also showed that more liquid IPOs experience better short-term performance due to increased investor participation.

The positive coefficient suggests that firms with higher liquidity attract greater demand, resulting in elevated short-term returns. This supports the liquidity premium hypothesis, where investors are willing to pay a premium for easily tradable securities. Enhancing liquidity during the IPO process can improve short-term market performance, reinforcing the strategic importance of maintaining market depth.

ANOVA analysis reveals no significant difference in first-day abnormal returns across groups categorized by high, medium, and low IPO volume. This contradicts the Hot Issue Market Hypothesis proposed by Ibbotson and Jaffe (1975), which posits that heightened IPO activity should be associated with greater underpricing due to increased investor demand and market optimism.

One potential explanation for this divergence is that the Borsa Istanbul may exhibit diminished speculative behavior or more stringent regulatory controls, which mitigate the impact of market cycles on IPO pricing. The absence of a hot issue market effect suggests that market timing is not a primary determinant of IPO underpricing on the Borsa Istanbul. This could indicate a more mature and regulated IPO market where pricing decisions are less influenced by seasonal demand fluctuations.

Firms employing the fixed-price book-building method experience 7,01% higher first-day returns compared to alternative pricing methods. This is consistent with Benveniste and Spindt (1989), who argue that book-building enables underwriters to gather information from investors and adjust prices accordingly, leading to higher initial returns. This method is particularly effective in mitigating information asymmetry.

This finding suggests that firms opting for book-building can achieve greater underpricing, which may be strategically advantageous for attracting a broader investor base and ensuring the successful completion of the IPO.

In conclusion, these findings provide valuable insights for investors, regulators, and issuers seeking to understand the determinants of IPO performance in emerging markets. The study underscores the complex interplay of financial variables, market conditions, and investor behavior in shaping IPO outcomes on the Borsa Istanbul.

7. Conclusion

In our study, we aimed to investigate whether there is underpricing in the stock prices of companies conducting IPOs on the BIST between 2010 and 2022/5, the short-term performance of stocks, the effect of ex-ante uncertainty on underpricing and short-term performance, sector-wise underpricing, the presence of a hot issue market, and the impact of short-term performance.

We observed underpricing in companies conducting IPOs between 2010 and 2022/5. These findings are consistent with the literature. However, the negative relationship between leverage ratio and first-day returns, where companies with higher leverage ratios and similar debt ratios are expected to have more underpricing in their IPOs, is not consistent with expectations. Ritter (1986) argues that high-risk firms underprice more compared to low-risk firms. This is because high-risk firms have higher ex-ante uncertainty regarding their stock prices, leading investors to demand underpricing as compensation for the risk. To avoid the "winner's curse problem," companies and underwriters are expected to underprice. However, our findings indicate that the changing risk composition does not explain the high initial abnormal returns. Our results do not align with Ritter (1986).

Another factor used to measure the relationship between ex-ante uncertainty and first-day abnormal returns is the standard deviation of market returns in the 30 days before the IPO. According to the results of simple linear regression analysis, there is no statistically significant relationship between first-day abnormal returns and the standard deviation of market returns in the 30 days before the IPO. These results indicate that market uncertainty was not taken into account by issuers and underwriters when determining the IPO price and by investors when purchasing shares. Investors did not price the volatility in the market. Additionally, the inverse relationship between leverage ratio and first-day returns can be interpreted as investors not exhibiting a risk-averse behavior. However, according to the results of multiple linear regression analysis, a strong negative relationship is observed between the standard deviation of market returns in the 30 days before the IPO and 30-day cumulative abnormal returns. It has been observed that investors price the volatility in the market and exhibit a risk-averse behavior in the short term. These results confirm the fads approach in IPOs between 2010 and 2022. In other words, the findings indicate that investors buy risky stocks with an optimistic outlook during the IPO period and move away from risky stocks as their optimism returns to normal over time.

This study makes the following contributions to the literature on underpricing and the short-term performance of companies that have undergone initial public offerings (IPOs) on Borsa Istanbul.

The study reveals an inverse relationship between the leverage ratio of IPO companies and their first-day abnormal returns. In the context of Borsa Istanbul, it is concluded that leverage ratios are not a reliable predictor of underpricing.

It demonstrates that companies with higher liquidity ratios achieve higher short-term returns. Contrary to traditional expectations, this finding suggests that firms with greater liquidity are not inclined to engage in underpricing.

The study shows that the market volatility during the 30 days preceding the IPO has no significant effect on first-day abnormal returns. This finding contributes to the literature by indicating that market uncertainty is not taken into account when determining IPO prices.

It is found that companies using the fixed-price book-building method exhibit higher first-day returns compared to other pricing methods. This result aligns with the view that book-building methods reduce information asymmetry, thereby leading to higher initial returns.

The research indicates that investors adopt an optimistic attitude toward riskier stocks during the IPO period, but this optimism gradually diminishes over time. This finding supports the "fads theory" hypothesis regarding IPOs.

These contributions provide new insights into IPO pricing dynamics in Turkey and other emerging markets, suggesting that some fundamental assumptions in the existing literature should be re – evaluated.

Author Contribution

CONTRIBUTION RATE	EXPLANATION	CONTRIBUTORS
Idea or Notion	From the research idea or hypothesis	Fevziye Gözde GÖKPINAR
Literature Review	Review the literature required for the study	Fevziye Gözde GÖKPINAR
Research Design	Designing method, scale, and pattern for the study	Fevziye Gözde GÖKPINAR & Güven SAYILGAN
Data Collecting and Processing	Collecting, organizing, and reporting data	Fevziye Gözde GÖKPINAR
Discussion and Interpretation	Taking responsibility in evaluating and finalizing the findings	Fevziye Gözde GÖKPINAR & Güven SAYILGAN

Conflict of Interest

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Resume

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