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**THE UNDERPRICING AND LONG RUN PERFORMANCE OF
INITIAL PUBLIC OFFERINGS
- Evidence from Turkey**

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ABSTRACT

This study investigates the underpricing and long run performance of initial public offerings in an emerging market economy, Turkey, by using event study methodology. Consistent with the evidence from international experiences, Turkish IPOs are underpriced by 7.3 percent on average during 1999-2007. Underpricing is higher in financials compared to non financials as measured by the first trading day market adjusted returns. Turkish IPOs are underpriced more in bullish markets consistent with “hot issue” markets. Pre event market trend is the most significant variable affecting underpricing while firm specific characters have minor effects in underpricing. 12 months after the offer, IPOs underperform the market by 12.4 percent. Firms with lower initial returns underperform more in contrast to international evidence though this result seems sensitive to the choice of the time interval.

Keywords: Initial public offerings, underpricing of IPOs, event study, Istanbul Stock Exchange

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1. Introduction

1.1 Background

The underpricing of initial public offerings (IPOs) is defined as the empirical fact that the offering price of a stock is commonly set below its true market value. In an efficient market, investors are expected to respond this gap between the offering price and fair price resulting in significantly high returns in the very first trading day of the stock. This underpricing issue of IPOs is backed by numerous empirical evidences both from mature and emerging markets. One of the seminal studies in this area is due to Ritter (1984) who reported a striking 48.4¹ percent average return on the first trading day of IPOs in US for the year 1980 which he called “hot issue” market. He also reported 16.3 percent average return during the 1977-1982 excluding 1980.

The stock exchanges of the emerging markets developed extensively in the last two decades parallel to financial liberalization and opening of the markets in many of them. As a result, the number of IPOs increased significantly. Several studies showed that IPO underpricing is also a common phenomenon in those markets. Some examples include Chi and Padgett (2005), Ghosh (2004) and Peter (2007).

Despite the vast amount of evidence for the underpricing of IPOs, the literature about the long run pricing behavior of IPOd firms’ shares are mixed. The majority of the studies for developed markets found evidence that in the long run IPOd firms underperform the market. Examples include Loughran and Ritter (1995) who reported an average 30 percent underperformance of IPOd firms in US compared to a benchmark portfolio five years after following going public and Arosio, Giudici and Pleari (2001) who analyzed the long run performance of IPOs in Italian market during 1985-1999 and found significant underperformance. Among all other factors, Arosio et al. (2001) also reported that the underpricing had a negative impact on the long run underperformance. That is, the higher initial return², the lower long run performance of IPOd

¹ Note that this is daily return not annual.

² The terms “initial return” and “underpricing” are used interchangeably.

firms' shares. On the other hand, Loughran, Ritter and Rydqvist (1994) did not find evidence of long run underperformance of IPOs in Swedish market during 1980-1990. For some emerging markets even outperformance of IPOd firms' shares in the long run are documented. For example, analyzing the IPOd firms during 1986-1995, Chun and Smith (2003) found that Korean IPOs outperform the market in the long run.

The empirical studies about underpricing and long run performance of IPOs try to find the determinants of variation in abnormal returns of IPOd shares. In the short run, they focus on asymmetric information among the parties involved in IPO while in the long run they focus on initial returns, investor optimism and market trends.

1.2 Purpose and structure

The objective of this study is to investigate the underpricing and long run performance of IPOs in an emerging market, Istanbul Stock Exchange (ISE), through event study methodology by using the most recent data. During 1999-2007, the Turkish IPOs provided the investors a market adjusted average returns of 7.3 percent in the first trading day. The returns of financials are higher compared to non-financials in the first trading day. In the long run, however, an average market adjusted underperformance of 12.4 percent is found for Turkish IPOs 12 months after public offering during 1999-2007.

The cross sectional variation in underpricing and long run performance 12 months after the issue are also analyzed. The results are roughly consistent with the previous research for underpricing while they reveal conflicting results in the long run.

The study is structured as follow: In the second section the literature about the pricing of IPOs both in the short run and long run are provided. Special emphasis is given to previous studies for Turkish IPOs. In the third section descriptive statistics of the ISE and IPOs during 1999-2007 are presented. The fourth section is devoted to the event study methodology which is used to measure the abnormal returns of IPOs. Having found significant abnormal returns for Turkish IPOs, in the fifth section, the cross sectional variations in abnormal returns are investigated both for initial returns and long run performance. The regressions for the initial underpricing enable

to test whether “ex ante uncertainty” is influential in underpricing. The long run analysis makes possible to investigate the relation between initial returns and long run performance.

2. Literature Review

2.1 Are IPOs underpriced?

Initial public offering is defined as the first time sale of equity shares of a private or governmental firm to many anonymous investors. The literature on the pricing of the common stock companies that is issued to the public for the first time dates back to Reilly and Hatfield (1969), McDonald and Fisher (1972) and Ibbotson (1975) who all found evidence of significant jump in the first trading day of the shares. This phenomenon is called underpricing. That is, the offer price of the stock is underpriced therefore its price increases sharply as soon as trading starts. Table 1 summarizes some of the studies about underpricing of IPOs in international markets.

Table 1: Underpricing of IPOs

Country	Source	Period	Sample size	Underpricing (%)
Argentina	Eijgenhuijsen and van der Valk (1997)	1991-1994	20	4.4
Australia (Industrials)	Lee, Taylor and Walter (1996)	1976-1989	226	16.4
Australia (Mining)	How (2000)	1979-1990	130	107.2
Brazil	Cigerza and Procianoy (2007)	2004-2006	29	7.1
Canada*	Jog and Riding, Jog and Srivastava, Kryzanowski, Lazrak and Rakita; Ritter	1971-2006	635	7.1
China (A-share)	Chi and Padgett (2005)	1996-2000	668	129.2
Denmark	Jakobsen and Sorensen (2000)	1984-1992	76	3.9
Finland*	Keloharju; Ritter	1971-2006	162	17.2
Germany*	Ljungqvist; Rocholl; Ritter	1978-2006	652	26.9
Norway*	Emilsen, Pedersen and Sættem; Liden; Ritter	1984-2006	153	9.6
India	Ghosh (2004)	1993-2001	1842	95.0
Italy	Cassia et al. (2004)	1985-2001	182	19.3
Sri Lanka	Peter (2007)	1996-2000	30	57.2
Sweden*	Rydqvist; Schuster; Simonov; Ritter	1980-2006	406	27.3
Switzerland	Aggarwal and Kunz (1994)	1983-1989	103	35.8

* The sources for Canada, Finland, Germany, Norway and Sweden are from the updated version of Loughran, Ritter and Rydqvist (1994) which can be found at <http://bear.cba.ufl.edu/ritter/ipodata.htm>.

Table 1 confirms the fact that underpricing of IPOs is a very common phenomenon both in mature and emerging markets. It is also worth noting that there is a great variation among countries in terms of IPO underpricing. While Jakobsen and Sorensen (2000) reported a mere 3.9 percent for Denmark during 1984-1992, Chi and Padgett (2005) found 129.2 percent for A-shares in China during 1996-2000. Table 1 shows that excluding Argentina and Brazil, emerging markets' IPOs seem to be underpriced more.

Underpricing is costly for firms. Ritter (1984) defines this cost as “the money left on the table” which is calculated as the difference between the offer price and the price of the stock at the end of the first trading day multiplied by the number of shares issued. Then, the natural question is “Why are IPOs underpriced?” if underpricing comes with a cost to firms. There are several theories to explain this question. Ljungqvist (2004) grouped them into four as: Asymmetric information models, institutional explanations, behavioral explanations and ownership and control matters. Among those, asymmetric information models which are actually examples of Akerlof's (1970) lemons problem are among the most tested ones. These models are based on the idea that one of the parties involved in IPO have more information than the others. Rock's (1986) “winner's curse”³ model is one of the most popular of this group of theories. In his model, Rock (1986) assumes that some of the investors are more informed than all other parties including the firm and the investment bank. These informed investors would bid IPOs which they find the offer underpriced and they will not bid for the overpriced or just priced IPOs. The uninformed investors do not have information about the under or over pricing of IPOs. So they bid for all IPOs. However, on average uninformed investors will find themselves investing more of overpriced IPOs (and losing money in the first trading day) since informed investors do not bid for overpriced IPOs and less of underpriced IPOs since informed investors bid aggressively on these IPOs. This is the winner's curse for uninformed investors. Having received lower or negative returns from investing in IPOs, uninformed investors would give up bidding for all IPOs in the long run as they cannot distinguish the under or over pricing of

³ The traditional example of “winner's curse” is the oil companies bidding for drilling rights in the Gulf of Mexico. There are many competitors for an asset of very high uncertain value resulting in a wide range of bids. The highest bidder wins and pays generally more than the expected value of the oil drilling area. That is, the winner is cursed as he pays more than expected cash flows of the investment. See Copeland, Weston and Shastri (2005)

the offer. However, the critical point is that the demand from the informed investors is not enough to meet the supply of all IPOs. Therefore, to also keep the demand of the uninformed investors in order to avoid the collapse of the IPO market, offer price is set systematically less than the fair market value.

Beatty and Ritter (1986) propose that there is a positive relationship between the “ex ante uncertainty” about the value of the firm and the underpricing of the initial public offering. They claim that this systematic underpricing is performed by investment banking firms who do not want to lose investors if they set the offer price too high, at the same time who do not want to lose issuers if they set the price too low. Ex ante certainty has been quite popular to explain the level of underpricing among researchers. There are numerous studies testing the hypothesis of whether ex ante uncertainty increases the underpricing of IPOs. These studies use several proxies like firm size, total proceeds, free float rate, IPO method and etc. as proxies for ex ante uncertainty. To mention some of the studies; Cassia et al. (2004) used age, total assets of the firm, sales method, market index and volatility as proxies for ex ante certainty. They found significant relation with the underpricing and total assets of the firm going public and market volatility in Italy. Lee et al. (1996) tested market value and total assets of the firm, ex ante price variation, prior operating history to explain the cross sectional variation in underpricing in Australian market. More detailed information about ex ante uncertainty proxies are given in section five.

Institutional explanations, behavioral explanations and ownership and control matters are the other group of theories listed by Ljungqvist (2004) to explain why IPOs are underpriced. Institutional explanations are related with the regulations in the IPO market. Therefore, they differ extensively among countries. The most common ones are legal liability, price stabilizations and tax issues. Ljungqvist (2004) argues that underpricing by the underwriter firm due to legal liability is generally observed in the US market. When the IPOd firm shares fall sharply, investors have the right to sue the underwriter by claiming that they are not well informed by the underwriter. To avoid this, underwriters have a tendency to underprice IPOs. In an expected utility maximization model Hensler (1995) suggested that a risk averse underwriter underprices

to avoid lawsuit costs if the share price declines sharply. However, the legal rights of the investors vary among countries and this theory does not explain the underpricing issue where investors do not have the right to sue the underwriter in case of a fall in share price. A second institutional explanation is the price support argument. In most countries, the underwriter has the right to manipulate the stock price for a certain period after the IPO by buying extensively to avoid downwards fluctuations in the price. Due to this practice, overpriced IPOs are rare. Another common institutional explanation of IPO underpricing is tax exemptions. For example, Rydqvist (1997) found that some of the underpricing of Swedish IPOs before 1990 can be explained by the lower tax rate on capital earnings compared to tax rate on income. Before 1990, it was a common practice for Swedish firms to provide shares to their employees before an IPO as an indirect compensation to benefit from the tax advantage. Rydqvist (1997) reports that after the removal of tax advantage on capital gains the underpricing in Swedish IPOs decreased.

Behavioral explanations suggest that underpricing is related to the existence of over optimistic investors and firms' timing of issues. By conducting a survey among IPO investors in US in 1989, Shiller (1990) reported that majority of the IPO investors took the prior market performance into account while investing in IPOs. They prefer bullish periods. These over optimistic investors bid up the IPOd shares away from its fair value resulting in higher initial returns. Shiller's (1990) results are consistent with Ritter's (1984) findings of "hot issue" markets. Hot issue markets are periods of bullish markets associated with large number of IPOs which are underpriced higher than normal times.

Ownership theories put forward that managers want to avoid individual investors to hold significant portion of shares after going public. Therefore, the offer price is set lower to attract a large group of investors. Analyzing the IPOs during 1977-1988 in US in terms of underpricing and post allocation of shares, Booth and Chua (1996) found that underpricing is positively related with the wide dispersal of ownership after going public.

2.2 The long run performance of IPOs

One of the first studies about the long run performance of IPOs is due to Ritter (1991) who found that 3 years after going public the IPOd firms underperformed benchmark indices which were constructed by similar firms in US market during 1975-1984. He also found that IPOd firms with a short operating history did worse in the long run. Another finding of Ritter (1991) is that firms which went public during bullish periods did worse in the long run. This finding was more significant for the smaller sized firms. Keloharju (1993) found 22.4 percent underperformance of Finnish IPOs during 1984-1989 again 3 years after the IPO. Cai, Liu, and Mase (2008) found out that IPOs underperformed on average 29.6 percent in A-share firms in China during 1997-2001 in the long run. They also listed initial returns as a factor negatively affecting the performance of IPOs in the long run. On the other hand, Lee et al. (1996) reported a modest underperformance of IPOd shares in the long run for Australian IPOs. They did not find evidence about initial returns and hot issue periods affecting the long run performance.

Despite the fact that majority of the studies found that IPOs underperform in the long run, there are some studies where outperformance of IPOs are also reported. For example, Allen, Kingsbury and Piboonthanakiat (1999) found that Thai IPOs during 1985-1992 in fact outperform the market by 10.0 percent three years after the issue. However, they also reported that their results are highly affected by some outliers in the period of study. Analyzing a sample of 130 mining firm IPOs during 1979-1990 in Australia How (2000) did not find evidence of long run underperformance. As mentioned earlier, Smith and Chun (2003) found even outperformance of IPOs in the long run in Korea. Table 2 summarizes some of the findings about the long run performance of IPOs. It is clear that especially in emerging markets, the evidence is mixed.

Table 2: Long run performance of IPOs

Country	Source	Period	Sample size	Interval	Performance (%)
Australia	Lee, Taylor and Walter (1996)	1976-1989	169	3 years	-51.3
Australia (mining firms only)	How (2000)	1979-1982	130	3 years	No significant underperformance
China	Cai, Liu and Mase (2008)	1997-2001	335	3 years	-29.6
Finland	Keloharju (1993)	1984-1989	80	3 years	-22.4
Thailand	Allen, Kingsbury and Piboonthanakiat (1999)	1985-1992	150	3 years	10.0
UK	Levis (1993)	1980-1988	712	3 years	Varies between -8.3 and -30.0
US	Aggarwal and Rivoli (1990)	1977-1987	1,598	1 year	-13.7
US	Ritter (1991)	1975- 1984	1,526	3 years	-26.1

One possible explanation suggested by Ritter (1991) to the long run underperformance is investor optimism. Investors might be over optimistic about the long run performance of an IPOd firm and overweight the stock; however, they become more rational through time. One of the questions asked by Ritter (1991) was whether the initial returns were influential in long run performance. This question is also related with the over optimism theory. The answer to this question was given by Levis (1993) who analyzed 712 IPOs during 1980-1988 and found that firms with lower initial returns underperformed less or outperformed. This point is interesting as it relates the long run performance to initial returns. Also, Arosio et al. (2001) found a negative relation between underpricing and long run performance.

2.3 Previous studies about Turkish IPOs

Kiyamaz (2000) analyzed the initial returns of the Turkish IPOs during 1990-1996 using a sample size of 163 firms. He found an average market adjusted underpricing of 13.1 percent. Following the literature about ex ante certainty to explain variation in underpricing among firms, he found that underpricing is negatively related with size of the firm. He also used the market return between the initial public offering date and first trading date as a proxy for market trend and found highly significant evidence that market return in this period is positively related with the

first trading day return.⁴ He also used a dummy variable to capture the differences when a firm's IPO is done by an investment bank or by a partner company. He suggests that when a firm itself or its partner investment banking firm underwrites the IPO, the information asymmetry is less therefore underpricing. Other variables like the firm's age, free float rate, IPO method and the differences between privatizations and private firms going public are not significant.

Aktas, Aydogan and Karan (2003) attempted to forecast initial returns of IPOs in the ISE. Their sample consisted of 190 IPOs during 1992-2000. They divided their sample into two as 1992-1996 and 1997-2000. Then, by using ex ante uncertainty proxies they explained the cross section variation in the underpricing of IPOs in the first sample, 1992-1996. Using multivariate regressions they found firm size and market trend as significant variables explaining initial returns similar to Kiyamaz's (2000) findings. Because the investors' main interest is the returns at hand after the IPO, they also estimated multiple discriminant and logit models using negative return and positive return as a binary dependent variable. Later they used those three models to predict the underpricing of IPOs in the second sample, 1997-2000. They found that multiple discriminant models truly predicted positive and negative return 65 percent of the time, while for the other two models predictive power was merely 50 percent.

Ozden (2005) used a sample of 134 IPOs during 1990-1997 and found an average market adjusted underpricing of 7.1 percent on first day of trading. In contrast to Kiyamaz (2000) and Aktas et al. (2003) she did not find evidence of market trend explaining initial performance. She reported firm size, free float rate, IPO method as significant variables for explaining initial returns. Ozden (2005) also studied the long run performance of IPOs. She reported an underperformance of IPOs by 12.8 percent one year after the offering. By cross sectional regressions for the long run return, she found a positive and significant coefficient for initial returns which is in contrast with the majority of the previous literature.

⁴ In Turkish IPOs there is roughly 3-4 working days gap between the initial public offering date and the first trading date.

Kucukkocaoglu (2008) focused on the effects of different sales methods implemented in Turkey on underpricing. Using a sample of 217 firms during 1993-2005, he found that underpricing is lowest in fixed price offers compared to book building and sales through stock exchange methods. He employed a binary probit model to relate the choice of sales method to firm specific variables, market and issue related characteristics. Due to inadequate number of data he omitted the book building method and constructed the binary probit model by using fixed price offers and sales through stock exchange. He found that the increase in total proceeds and net profit increases the probability of choosing the fixed price method. Table 3 summarizes the findings of different studies about the Turkish IPOs.

Table 3: Summary of the previous studies about the Turkish IPOs

Source	Period	Sample size	Underpricing (%)	Long run Performance (%)
Kiyamaz (2000)	1990-1996	163	13.1	-
Aktas (2003)	1992-2000	190	9.2	-
Ozden (2005)	1990-1997	134	7.1	-12.8 (1 year)
Kucukkocaoglu (2008)	1993-2005	217	9.6*	-

* Author reported the underpricing for different IPO methods. He did not report it for the whole sample. This value is calculated by taking the weighted average of them.

This study revisits the underpricing and long run performance of IPOs by using more recent data. One of the contributions of this study is to explain the variation in underpricing by using the second trading day cumulative abnormal returns as well as first day abnormal returns. This is done due to the implementation of daily volatility limits in the ISE. According to the regulations of ISE during the sample period, the price of a stock is not allowed to rise more than 21 percent in a day. Therefore, significant average abnormal returns are observed also in the second day of trading. Another contribution is investigating whether sales methods are influential in IPO underpricing. Kucukkocaoglu (2008) compared fixed price and sales through stock exchange methods but due to inadequate data he did not include book building method. However, in the last two years majority of the IPOs used this method making it possible to investigate its effects. Besides, long run performance of Turkish IPOs have not been investigated recently. This study attempts to fill this gap.

3. The Istanbul Stock Exchange and Turkish IPOs during 1999-2007

The ISE started to operate in 1986. It is the only stock exchange in Turkey. It has a very short history compared to the stock markets in developed countries. However, it displayed a fast growth in the recent years. The market capitalization was 144 billion USD in 1999, after bottomed to 34 billion USD at the end of 2002, it increased sharply to 290 billion USD at the end of 2007. There are 319 listed companies in ISE as of end 2007. The number of listed companies dipped in 2002 due to the financial crisis in 2001⁵ then it started to increase again. It is an emerging market stock exchange and subject to high volatility. There are no restrictions on foreign investments in ISE. It is highly sensitive to changes in the global risk appetite since more than 70 percent of all the shares traded are owned by foreign investors as of end 2007.⁶ Analyzing the weekly series during 1990-2005 by variance ratio tests, Ozdemir (2008) suggests that ISE can be characterized as a weak form efficient market. Table 4 summarizes the development of ISE during 1999-2007.

Table 4: The development of the ISE during 1999-2007

	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of listed companies	285	315	310	288	285	297	304	316	319
Foreigners' share	-	-	-	-	51.5	54.9	66.3	65.3	72.4
Index (ISE-100)	5,792	14,476	10,138	10,987	12,271	19,910	29,382	39,779	48,239

Source: Istanbul Stock Exchange

Majority of the Turkish firms are family owned companies. The number of state run firms is also high. These companies go public for several reasons: The trading of shares in an organized market at a fair price determined by the supply and demand conditions enhances the liquidity of firms. Besides, having obliged to several legal, accountancy and transparency regulations, firms boost their corporate governance adding more value to themselves. In addition, going public also is a way of advertisement considering the fact that the common stock companies are cited

⁵ For a detailed account of the November 2000 and February 2001 crisis see Rijckeghem and Ucer (2006)

⁶ All the data is from the website of the Istanbul Stock Exchange and can be reached through <http://www.ise.org/data.htm>

more often in media. The ongoing privatization program also leaves some portion of the state run firms' shares to free float.

96 firms went public during 1999-2007. However 8 of them are omitted from the analysis due to inadequate data. These omitted firms are the ones which are no longer listed in the index. They went bankrupt, could not fulfill the listing requirements or merged with other firms. Therefore 88 firms are included in the analysis. Table 5 shows the frequency of IPOs during 1999-2007. On average about 10 firms go public each year. However, they are not distributed equally among years. For example, in 2000, 36 firms went public. One year later there is only one. However the unequal distribution of IPOs is common in the IPO markets as proposed by Ritter (1984). The highest number of IPOs is in 2000, the year just before the financial crisis in Turkey. In 2000, the index recorded its highest annual increase. Therefore, the fact that the highest number of issues were done in this year also confirms Ritter's (1984) proposition of IPOs concentrated on bullish periods of the market.

Table 5: Frequency of IPOs used in the analysis, 1999-2007

	Number of IPOs included in the analysis	Number of omitted IPOs	Total revenue (million USD)
1999	10	(1)	91.0
2000	34	(2)	2,806.0
2001	0	(1)	-
2002	4	-	56.5
2003	2	-	11.3
2004	12	-	965.2
2005	8	-	1,744.0
2006	10	(3)	913.2
2007	8	(1)	3,295.6
Total	88	(8)	9,882.8

In November 2000 and February 2001, the Turkish economy experienced the most severe financial crisis in its history where the GDP contracted by more than 10 percent, local currency tumbled coupling with a stock market crash. Therefore, there is only one IPO in 2001 which is omitted from the analysis as the bank that went public merged with another bank later. Even though there are only 8 IPOs in 2007, the highest revenues were obtained in that year mainly due to the big stakes in the privatization agenda. Of the 88 firms used in the analysis during

1999-2007, 26 are industrials, 20 are services, 24 are financials, 6 are technology and 12 are investment trusts.

There are two different methods to go public in Turkey: Sale of shareholder or capital increase. In some cases firms can do a combination of both. Among those 88 firms, 24 chose to go public by sale of shareholder, 38 by capital increase and 26 by both.

Firms can also pick from different sales methods. Either sales through stock exchange or fixed or book building method. In the sales through exchange model the sale of shares are done in a primary market. After a certain period investors who bought shares in the primary market can start trading in the secondary market. The opening price is the price determined at the registration to Capital Markets Board of Turkey. In the fixed price offer, the offer price is known by the investors and they bid the amount they demand in a bid collection period. Then the shares are allocated to investors weighted accordingly to the deposited money for their bids. The procedure of the book building is similar to fixed price offer. However, in this case the price is not known by the investors but an indicative price band is determined by the underwriter. (Kucukkocaoglu, 2008) The general rule is: The higher demand for shares for an indicative price range, the closer price to the upper bound of the indicative range. Among the 88 IPOs during 1999-2007, 58 of them used fixed price offer, 15 of them used book building method and again 15 of them used sales at the ISE.

Underpricing can be negative if the stock price falls in the first trading day. That means the offer price is overpriced. 23 firms among the 88 firms have negative first trading day returns, 27 of them have negative cumulative abnormal returns in the second trading day.

4. Methodology

4.1 Event Study

The efficient market hypothesis asserts that the price of a stock should reflect the information that is known by market participants. We should observe that the stock price changes instantly

by taking this new information into account. In the case of IPOs, if the market is efficient, the markets should be reacting quickly in the very first trading days of the stock to reflect any under or over pricing of the determined IPO price.

An event study measures whether the returns on a particular equity or a portfolio of equities are significantly different from what is expected, given by a set of assumptions and information available before the event time. Therefore, after selecting the sample and defining the events, a model to determine the normal returns should be selected. In order to find normal returns we have to define an estimation period which is a period of time over which no event has occurred. After finding normal returns, we will be able to calculate abnormal returns, aggregate them and test whether the event has significant effect. There are different approaches to calculate abnormal returns:

Constant mean return model

The constant mean return model simply assumes that the expected normal return of a stock in the event window is the mean of the returns on the estimation window. The abnormal returns are then defined as the difference between the mean return and the actual returns. Even though this model seems an oversimplification, it gives similar results to more advanced models.⁷ The abnormal return AR_{it} is defined as:

$$AR_{it} = R_{it} - \bar{R}_i \quad (1)$$

where \bar{R}_i is the arithmetic average of the stock i 's return over the estimation window and R_{it} is the return on stock i at time t .

Market model

This model is one of the most commonly used models to calculate the expected normal returns in the event window. With this method, the return of any stock is related to the return of the market by a regression:

⁷ See Brown and Warner (1985)

$$AR_{it} = R_{it} - \hat{\alpha}_i - \hat{\beta}_i R_{mt} \quad (2)$$

where $\hat{\alpha}_i$ and $\hat{\beta}_i$ are the estimated OLS coefficients from the estimation window and R_{mt} is the market return at time t . The usual OLS assumptions of zero expected errors and constant variance is maintained.

Campbell et al. (1997) suggests that this model provides an improvement over the constant mean return model by reducing the variance of the abnormal returns. The degree of improvement depends on the R-squared of the regression; that is, the more variation in the stock returns explained by the market return.

Market adjusted return model

This model assumes that the mean of the stock's return over the event window is expected to be equal to the mean of the market's return over the event window. This model can actually be classified as the market model where the parameters α and β are equal to 0 and 1 respectively. Therefore, there is no estimation period required before or after the event. The abnormal returns are simply defined as the difference between the stock return and market return:

$$AR_{it} = R_{it} - R_{mt} \quad (3)$$

Other models

In addition to above mentioned models to calculate normal returns, there are also some other models which restricts the parameters more by also including the economic theory. (Campbell et al., 1997) Capital Asset pricing Model due to Sharpe (1964) and Linther (1965b) and the Arbitrage pricing Theory due to Ross (1976) are examples to these kinds of models.

The case where event studies might cause serious problems is event clustering. It is defined as the situation where the firms in the sample have event dates that are very close to each other. Market wide events such as macroeconomic announcements are examples of event clustering. The overlapping of the event windows results in high correlation among abnormal returns which

violates the distributional assumptions of testing cross sectionally aggregated abnormal returns. Obviously, event clustering is not an issue for measuring the abnormal returns of IPOs.

4.2 Choice of the model

In this study, the market adjusted return model defined in (3) is employed. Even though this model is not the most common model in general, it is the most common model used when examining IPOs. IPOs are a special case for event studies because of the fact that there is no pre-event estimation period for the expected normal returns. The fact that the market adjusted mean return model does not require a separate estimation window makes it more appealing to examine behavior of IPOs. Besides, we do not need to worry about the assumption that past relationships in the data will also hold in the future. However, the pitfall is we do not know if the market return is a good proxy for expected returns.

The returns on stock i at day t is calculated as

$$R_{it} = \ln\left(\frac{P_{it}}{P_{i,t-1}}\right) \quad (4)$$

where P_{it} and $P_{i,t-1}$ are the closing prices for the stock.

The market return is defined as

$$R_{mt} = \ln\left(\frac{I_t}{I_{t-1}}\right) \quad (5)$$

where I_t and I_{t-1} are the market index for two consecutive days. In this study, ISE-100 index is used as a proxy for the market return. It is the benchmark index in Turkey and often used as a proxy for the market index in other studies, too.

The average abnormal return for n stocks on day t , AR_t is:

$$AR_t = \frac{1}{n} \sum_{i=1}^n AR_{it} \quad (6)$$

The cumulative average abnormal return in the s^{th} day after trading starts CAR_s is:

$$CAR_s = \sum_{t=1}^s AR_t \quad (7)$$

The hypothesis that the AR_t equals to zero is tested by the test statistic

$$\frac{AR_t}{SE(AR_t)} \quad (8)$$

where $SE(AR_t)$ is standard error of AR_t and equals to

$$\frac{\sigma(AR_t)}{\sqrt{n}} \quad (9)$$

The hypothesis that the CAR_s equals to zero is tested in the same manner with the test statistic

$$\frac{CAR_s}{SE(CAR_s)} \quad (10)$$

where $SE(CAR_s)$ is the standard error of CAR_s and equals to

$$\frac{\sigma(CAR_s)}{\sqrt{n}} \quad (11)$$

4.3 The model for underpricing

After calculating the average and cumulative average abnormal returns, the second step is to run cross sectional regressions in order to determine the factors affecting the pricing of IPOs.

This is done both for the initial returns and long run performance.

The models for the initial returns are

$$AR_1 = \beta_0 + \beta_1 \ln(ASSETS) + \beta_2 \ln(AGE) + \beta_3 D_{FIN} + \beta_4 \ln(PROCEEDS) + \beta_5 RATE + \beta_6 D_{BIG} + \beta_7 D_{METHOD, SALE OF SHAREHOLDER} + \beta_8 D_{METHOD, CAPITAL INCREASE} + \beta_9 D_{SALES, FIXED PRICE} + \beta_{10} D_{SALES, BOOK} + \beta_{11} TRENDLONG + \beta_{12} TRENDSHORT + \varepsilon \quad (12)$$

and

$$\begin{aligned}
CAR_2 = & \beta_0 + \beta_1 \ln(ASSETS) + \beta_2 \ln(AGE) + \beta_3 D_{FIN} + \beta_4 \ln(PROCEEDS) + \\
& \beta_5 RATE + \beta_6 D_{BIG} + \beta_7 D_{METHOD, SALE OF SHAREHOLDER} + \\
& \beta_8 D_{METHOD, CAPITAL INCREASE} + \beta_9 D_{SALES, FIXED PRICE} + \beta_{10} D_{SALES, BOOK} + \\
& \beta_{11} TRENDLONG + \beta_{12} TRENDSHORT + \varepsilon
\end{aligned} \tag{13}$$

where ε is the error term with usual assumptions.

The dependent variable is underpricing. It is generally defined as the first trading day return, AR_1 . Previous studies about Turkish IPOs also used it as underpricing. However, according to the current implementation in the ISE, the return on a particular security cannot exceed 21 percent in one trading day and the results also showed significant abnormal returns in the second trading day. Therefore, CAR_2 is also used as underpricing in a separate model.

The independent variables are classified as firm specific, issue related and market related.

Firm specific variables

ASSETS: The assets size is one of the most common used proxies for ex ante uncertainty. Kiyamaz (2000) found significant negative relation between the firm size and underpricing for Turkish IPOs during 1990-1996. Ghosh (2005) reported that underpricing is lower for the large firms going public in Bombay Stock Exchange during 1993-2001. The total asset size of the firms obtained from their latest balance sheets just before going public is used. Due to the fact that the inflation rate in Turkey is not negligible during 1999-2007, the figures are converted to USD using the USD/TRY FX rate at the time of the balance sheet. The hypothesis is that underpricing is less in large firms compared to small ones, therefore a negative coefficient is expected for the *ASSETS*. In order to avoid the large fluctuations natural logarithm of the original values are used.

AGE: The operating history of the firms is also used as a proxy for ex ante uncertainty. The hypothesis is that investors would have less uncertainty about the firms with a longer operating history. Similar to *ASSETS* also a negative coefficient is expected. Again natural logarithms are

used. In order to avoid zero values for firms with 1 year operating history 1 year is added to all firms' operating history.

D_{FIN} : The inclusion of this dummy variable which takes value 1 if the firm is a financial and 0 otherwise is due to the empirical fact that financial firms are significantly underpriced more than other firms.⁸ A positive sign is expected. Financial firms are defined according to the classification system of ISE. No dummies are added for other sectors due to the fact that the average abnormal returns are found close to each other.

Issue related variables

PROCEEDS: It refers to the total revenue raised from an IPO. This variable depends on the size of the firms, free float rate and price of the share. Actually, *PROCEEDS* is a combination of these three variables and has a considerable correlation with them. Several studies used it as a proxy for ex ante certainty. Similar to *ASSETS* the USD values are used. The hypothesis is that IPOs with higher amount of proceeds are underpriced less. Similar to *AGE* and *ASSETS*, a negative coefficient is expected.

RATE: This variable is the ratio of shares offered to the public to total shares, also referred as the free float rate. The hypothesis is uncertainty would be less when the free float rate is high as it is a signal for firm's commitment. A negative coefficient is expected.

D_{BIG} : This variable is a dummy which takes value 1 if there is an investor who buys more than 5 percent of the shares issued and 0 otherwise. The inclusion of this variable is directly related to the winner's curse problem of Rock (1986). The "big investor" who buys more than 5 percent of the shares represents the informed investor. Therefore big investors tend to involve more in underpriced IPOs. On the other hand, ownership and control matters suggest that managers would prefer to underprice more to attract a large shareholder base and to avoid one investor to take a large share of the IPOd shares. However, institutional investors who invest on behalf of a large number of retail investors, for example hedge funds, are also counted as big investors. A positive coefficient is expected. Aktas et al. (2003) also take into account if there is a foreign

⁸ See Table 8 Panel A

investor bidding for the IPO assuming that they have better access to information. However, his analysis covers 1992-1996 when foreign investors' interest on ISE was lower and they were not bidding for every IPO. However during 1999-2007, foreign investors bid for almost every IPO, so there is not enough variation to include it.

$D_{METHOD,SALE OF SHAREHOLDER}$ and $D_{METHOD,CAPITAL INCREASE}$: There are three IPO methods in Turkey as mentioned earlier. Therefore two dummies are added. $D_{METHOD,SALE OF SHAREHOLDER}$ is a dummy variable which takes value 1 if the issue is a sale of shareholder and 0 otherwise. $D_{METHOD,CAPITAL INCREASE}$ is a dummy variable which takes value 1 if the issue is a capital increase and 0 otherwise. The other IPO method is combination of these two. It is expected that the IPOs which involve only sale of shareholder might be underpriced less. For example, an IPO which is due to a partner of a company who sells her share before her retirement involves less uncertainty than an IPO which is only done to increase capital in a booming market.⁹

$D_{SALES,FIXED PRICE}$ and $D_{SALES,BOOK}$: There are three different sales methods in Turkey: Fixed price offer, book building and sales through stock exchange. Therefore two dummy variables are added. $D_{SALES,FIXED PRICE}$ is a dummy variable which takes value 1 if the offer is fixed price and 0 otherwise. $D_{SALES,BOOK}$ is a dummy variable which takes value 1 if the offer is a book building and 0 otherwise. There are no predetermined coefficients for these dummies.

Market related variables

$TRENDLONG$ and $TRENDSHORT$: Ritter (1984) found evidence that IPOs tend to be underpriced more when the market is bullish which he called hot market issue. These variables are included in order to capture this effect. $TRENDLONG$ measures the long run trend in the market which is the 3 months change in the ISE index and $TRENDSHORT$ measures the short run trend which is the 1 month change in ISE index both before the first trading day of the IPO. A positive relationship is expected between underpricing and these trend variables. Table 6 summarizes the variables used and expected coefficients for underpricing.

⁹ The example is given by Copeland, Weston and Shastri (2005)

Table 6: Summary of the variables used in initial returns

Variable	Explanation	Expected Sign
<i>ASSETS</i>	Total assets of the firm before going public in USD	Negative
<i>AGE</i>	Operating history of the firm	Negative
<i>D_{FIN}</i>	Dummy, if firm is a financial	Positive
<i>PROCEEDS</i>	Total revenue obtained	Negative
<i>RATE</i>	Free float rate of the firm	Negative
<i>D_{BIG}</i>	Dummy, if there is an investor buying more than 5 percent of the total free floating shares	Positive
<i>D_{METHOD,SALE OF SHAREHOLDER}</i>	Dummy, if the IPO is sale of shareholder	Negative
<i>D_{METHOD,CAPITAL INCREASE}</i>	Dummy, if the IPO is capital increase	Positive
<i>D_{SALES,FIXED PRICE}</i>	Dummy, if the offer is fixed price	No predetermined sign
<i>D_{SALES,PRICE BAND}</i>	Dummy, if the offer is a price band	No predetermined sign
<i>TRENDLONG</i>	1 month market return before the first trading day	Positive
<i>TRENDSHORT</i>	3 month market return before the first trading day	Positive

Note that the third IPO method in addition to sale of shareholder and capital increase is the sale of shareholder and capital increase at the same time and the third sales method in addition to fixed price and price band offer is the sales through stock exchange.

4.4 The model for the long run performance

The long run performance is investigated by the models

$$CAR_{12\ months} = \beta_0 + \beta_1 AR_1 + \beta_2 \ln(ASSETS) + \beta_3 RATE + \beta_4 TREND + \beta_5 D_{FIN} + \varepsilon \quad (14)$$

and

$$CAR_{12\ months} = \beta_0 + \beta_1 CAR_2 + \beta_2 \ln(ASSETS) + \beta_3 RATE + \beta_4 TREND + \beta_5 D_{FIN} + \varepsilon \quad (15)$$

where ε is the error term with the usual assumptions. Defining two separate models with AR_1 and CAR_2 as independent variables is due to the fact that the correlation between these two variables is high and might cause multicollinearity if they are included in the same regression. The correlation matrix of the variables used in underpricing and long run performance are given in the appendix.

AR_1 : This variable is the abnormal returns in the first trading day. Ritter (1991) suggested that there might be a negative relation between the long run performance and initial returns and

Levis (1993) found that the higher initial returns are associated with poorer long run performance. Therefore a negative coefficient is expected.

CAR₂: For some countries like Turkey where there are daily volatility limits, underpricing can be measured by more than one trading day. The expected coefficient is negative similar to *AR₁*.

ASSETS: This variable is defined the same way as explained above. Following Ritter's (1991) arguments, IPOd firms with greater asset size are expected to outperform lower sized firms in the long run. Therefore, a positive coefficient is expected.

RATE: This is also defined as the same way above. A positive coefficient is expected.

TREND: Ozden (2005) argued that the long run performance should be negatively related with the market performance in the same period if market adjusted returns are used. Following her argument, a negative coefficient is expected.

D_{FIN}: This variable is also the same as defined above. The inclusion of it is due to the fact that Financials index beat the market index during majority time of study. Therefore, market adjusted returns for financials tend to be higher than non-financials. A positive coefficient is expected.

Issue related variables used in determining the initial returns except *RATE* are not employed in determining the long run performance. This is due to the assumption that the inclusion of initial returns as an independent variable for the long run models captures the impacts of those omitted variables. Table 7 summarizes the variables and expected coefficients for the long run performance of IPOs.

Table 7: Summary of the variables used in long run performance

Variable	Explanation	Expected Sign
<i>ASSETS</i>	Total assets of the firm before going public in USD	Positive
<i>D_{FIN}</i>	Dummy, if firm is a financial	Positive
<i>RATE</i>	Free float rate of the firm	Positive
<i>AR₁</i>	First trading day abnormal returns	Negative
<i>CAR₂</i>	Second trading day cumulative abnormal returns	Negative
<i>TREND</i>	Market return during the interval cumulative abnormal return is calculated	Negative

5. Results

5.1 Underpricing

Panel A of Table 8 shows the market adjusted average abnormal returns during 1999-2007. The IPOs during this period are also grouped as financials and non-financials. The average abnormal return for the first trading day for the whole sample is 7.3 percent. This is lower than the findings of Kiyamaz (2000), Aktas et al. (2003) and Kucukkocaoglu (2008) for the 1990-1996, 1992-2000 and 1993-2005 periods, respectively. However, it is close to the Ozden's (2005) finding of 7.1 percent for 1990-1997. Financials provided an average abnormal return of 10.5 percent and it is highly significant. First day market adjusted returns of non financials is considerably lower than financials with 6.2 percent. This number is also highly significant.

For the second trading day, again a highly significant average abnormal return of 2.4 percent is observed for the all IPOs. The significant and positive second trading day average abnormal return of 2.4 percent is attributable to the fact that ISE, like many other emerging market stock exchanges, has a daily volatility limit which has been constant at 21 percent for the analysis period of 1999-2007. Therefore, some of the IPOs which are underpriced more than 21 percent should display abnormal returns also in the second trading day. Despite the fact that the second trading day average abnormal return is significant for the whole sample, it is not significant for financials as a group. It is interesting to note that non financials which provided lower returns in the first trading day compared to financials provide an average abnormal return of 2.9 percent

return at the end of second trading day; higher than financials and highly significant. This result shows that markets react to underpricing of financials quicker than non financials. The firm size of the financials is generally greater than non financials. According to the Beatty and Ritter's (1986), findings, we would expect a lower underpricing of financials considering the asset size. IPOs of financials also include some big stakes in privatizations. Foreign investors show more interest in financials. On the other hand, even though non financials include some big industrials, majority of firms are smaller sized and less known by public. Therefore, the market of IPOs of non financials can be classified as less efficient than the market of IPOs of financials. That is, it takes time for investors to react the underpricing in non financials.

Though they are not significant, the third and fourth day average abnormal returns for non financials are still positive while they are negative for financials. It is interesting to note that the average abnormal returns in fifth day of the trading for the whole group is negative, though weakly significant.

These results show that Turkish IPOs are underpriced on average, though to a lesser extent compared to the other emerging market experiences.¹⁰ Markets react to underpricing of financials quicker than non financials.

Panel B of Table 8 shows that cumulative average abnormal returns for the whole sample are highly significant for the first seven days of trading. The highest cumulative average abnormal return is on the fourth day of trading. The second day cumulative average abnormal return is of special importance as significant average abnormal returns for the first and second trading days have been found. Cumulative average abnormal returns for the second day stay at 9.7 percent for the all IPOs, 11.5 percent for financials and 9.1 percent for non financials.

¹⁰ See Table 1

Table 8:**Panel A: Average abnormal returns**

Sector	AR_1	AR_2	AR_3	AR_4	AR_5	AR_6	AR_7
Financials	10.48 (5.66)***	1.03 (0.65)	-2.13 (-1.59)	-0.11 (-0.12)	-0.81 (-0.63)	1.26 (0.86)	0.23 (0.21)
Non financials	6.16 (4.24)***	2.90 (3.00)***	1.02 (1.01)	0.15 (0.17)	-1.15 (-1.55)	-0.40 (-0.64)	-0.53 (-0.87)
All	7.34 (6.20)***	2.39 (2.89)***	0.16 (0.19)	0.08 (0.12)	-1.05 (-1.65)*	0.05 (0.09)	-0.32 (-0.61)

Panel B: Cumulative average abnormal returns

Sector	CAR_2	CAR_3	CAR_4	CAR_5	CAR_6	CAR_7
Financials	11.51 (3.72)***	9.38 (2.38)**	9.27 (2.43)**	8.46 (1.84)*	9.72 (1.83)*	9.96 (1.64)
Non financials	9.06 (4.43)***	10.08 (3.84)***	10.23 (3.32)***	9.09 (2.80)***	8.68 (2.41)**	8.15 (2.21)**
All	9.73 (5.71)***	9.89 (4.54)***	9.97 (4.05)***	8.91 (3.35)***	8.97 (3.01)***	8.64 (2.76)***

The numbers in parentheses show the t-statistics

*** Significant at 1 percent

** Significant at 5 percent

* Significant at 10 percent

The above results show that Turkish IPOs during 1999-2007 are significantly underpriced. This is in line with the previous findings. Having found significant average abnormal returns, the next step is to investigate the cross sectional variation in underpricing in order to test Beatty and Ritter's (1986) hypothesis of ex ante uncertainty which states that higher ex ante uncertainty causes higher underpricing in IPOs.

The results of the model for underpricing are given in Table 9. Regressions are run for both abnormal returns in the first day and cumulative abnormal returns in the second day as dependent variables.

Table 9: Multivariate regression results for underpricing

Sample size: 88 Independent Variables	Dependent Variable: AR_1				Dependent Variable: CAR_2			
	1	2	3	4	1	2	3	4
<i>Constant</i>	0.231	0.131	0.046*	0.097***	0.149	0.200	0.067*	0.110***
<i>ASSETS</i>	-0.002	-0.003	-	-	-0.003	-0.005	-	-
<i>AGE</i>	0.012	0.013	0.013	-	0.018	0.001	0.016	-
D_{FIN}	0.042	0.049*	0.044*	0.042*	0.024	0.028	0.021	0.020
<i>PROCEEDS</i>	-0.006	-	-	-	-0.004	-	-	-
<i>RATE</i>	-0.044	-0.024	-	-	0.011	-0.051	-	-
D_{BIG}	-0.043*	-0.042*	-0.043*	-0.042*	-0.031	-0.038	-0.037	-0.036
$D_{METHOD,SALE OF SHAREHOLDER}$	0.000	-	-	-	0.002	-	-	-
$D_{METHOD,CAPITAL INCREASE}$	-0.010	-	-	-	0.047	-	-	-
$D_{SALES,FIXED PRICE}$	-0.045	-0.038	-	-0.034*	-0.018	-0.021	-	-0.014
$D_{SALES,BOOK}$	0.022	-	-	-	0.032	-	-	-
<i>TRENDLONG</i>	0.032	-	-	-	0.014	-	-	-
<i>TRENDSHORT</i>	0.196***	0.214***	0.222***	0.212***	0.277**	0.294***	0.315***	0.301***
R squared	0.23	0.22	0.19	0.20	0.15	0.13	0.13	0.12
DW	1.63	1.58	1.58	1.53	1.51	1.50	1.51	1.46
F-stat	1.87**	3.17***	4.88***	5.04***	1.12	1.77*	3.02**	2.79**

*** Significant at 1 percent
 ** Significant at 5 percent
 * Significant at 10 percent

Among the firm specific variables, *ASSETS* and D_{FIN} have the expected coefficients. *ASSETS*, as suggested by the Beatty and Ritter's (1986) ex ante uncertainty theory is negatively related with the underpricing. However, it is not significant in any of the specifications. Previous studies about Turkish IPOs also find negative coefficients for the size of the firms, in some of them it was also significant, e. g. Kiyamaz (2000). D_{FIN} has a positive and significant coefficient in some of the specifications when the dependent variable is AR_1 . However, it is not significant when the dependent variable is CAR_2 . This is actually what is expected when second day cumulative abnormal returns are used as dependent variables due the fact that non financials also give positive significant average abnormal returns in the second trading day opposed to financials. That is, in terms of cumulative figures they catch the higher underpricing of financials in the first day. *AGE* has a positive coefficient opposed to expectations, however, it is insignificant. This might be due to the fact that *AGE* variable is subject to a measurement error. Most companies with a longer operating history are actually recorded as younger companies as they went into a restructuring program or changed its name for some reason. For example an IPO of a partner company of a very well established financial conglomerate is recorded as a 1 year old company.

Therefore, in Turkish IPOs age is not a good proxy for ex ante uncertainty since it is difficult to find the actual operating history of the IPOd firm.

Among the issue related variables, *PROCEEDS* and *RATE* have the expected signs in some of the specifications however they are not significant. This is parallel to the findings of other studies about Turkish IPOs. *D_{BIG}*, which shows the existence of an investor having more than 5 percent of the shares is weakly significant when AR_1 is the dependent variable. Its sign, however, negative opposed to the expectation. This shows that IPOs are underpriced less when such an investor exists. This is in contradiction with the winner's curse hypothesis of Rock (1986). *D_{METHOD,SALE OF SHAREHOLDER}* and *D_{METHOD,CAPITAL INCREASE}* are not significant and their coefficients are mixed. It seems that IPO method does not have a significant influence in underpricing. When sales methods are analyzed, it is seen that fixed price offers are underpriced less compared to sales through stock exchange method. In some specifications, this result is weakly significant. This is parallel to the findings of Kucukkocaoglu (2008)

Among the market related variables, In line with the "hot issue" market theory by Ritter (1984), the trend variables have positive coefficients. *TRENDSHORT* is highly significant in all of the specifications. That is, IPOs are underpriced more in bullish markets. Especially, the short run trend is much more influential then the long run trend in the market when pricing IPOs.

The results are clearer when AR_1 is used as the dependent variable. Most findings except the short run trend are not significant when the dependent variable is CAR_2 . That is, using second trading day cumulative abnormal returns to measure underpricing does not bring further evidence about the factors explaining the variation.

5.2 Long run results

Table 10 shows the cumulative average abnormal returns 3 months, 6 months, 9 months and 12 months after the issue. Note that 4 of the IPOs which were done in the second half of 2007 were omitted when calculating the 12 months average CARs because of data unavailability. Therefore the sample size for the long run analysis is 84. There is a significant underperformance of 12.4 percent 12 months after the issue. However, when financials and non-financials are analyzed

separately, it is observed that non-financials suffer from more severe and highly significant underperformance of 17.4 percent while financials provided 5.2 percent positive return in this period though insignificant. The negative performance of 12.4 percent 12 months after the issue is in line with Ozden's (2005) findings. One possible explanation for the positive abnormal returns for financials one year after the issue might be due to the fact that financials index outperformed the market especially after 2002. Therefore, market adjusted returns are generally higher than non financials most of the time. More realistic results would have been found if IPOs of financials were adjusted by the financials index not the market index.

Table 10: Long run performance

Sector	<i>CAR</i> _{3 months}	<i>CAR</i> _{6 months}	<i>CAR</i> _{9 months}	<i>CAR</i> _{12 months}
Financials	14.00 (1.34)	8.43 (0.75)	20.60 (1.95)*	5.19 (0.41)
Non financials	10.97 (1.72)*	1.37 (0.18)	-8.10 (-1.10)	-17.38 (-2.56)***
All	11.64 (2.13)**	2.92 (0.45)	-1.81 (-0.29)	-12.43 (-2.05)**

*** Significant at 1 percent

** Significant at 5 percent

* Significant at 10 percent

Table 11 shows the results of the multivariate regressions for the long run performance. The most remarkable result is the positive and highly significant coefficient of AR_1 and CAR_2 . This result is completely opposed to the expectations. It means that firms which underpriced more at the offer or the firms which have high initial returns in the beginning also perform better in the long run. Also, it is inconsistent with the Levis's (1993) findings. However, it is parallel to Ozden's (2005) findings for Turkish IPOs during 1990-1997. This result might be due to short time span of the study. Even though there are studies which take 1 year as the long run, most studies focus on 3 years and more. The positive and significant coefficients for initial returns show that investor optimism is still effective 12 months after the issue.

ASSETS have negative sign opposed to expectations however it is insignificant. *RATE* also have negative coefficient opposed to the expectations and it is also significant which means firms with a higher floating rate underperforms more in the long run.

The negative relationship between the market trend one year after the issue and the long-run performance is parallel to expectations since the cumulative market adjusted average return is used in this study. Ozden (2005) also reached a negative coefficient for the market trend in her study during 1990-1997.

Table 11: Multivariate regressions for the long run performance

Sample size: 84 Independent Variables	Dependent variable: $CAR_{12\ months}$			
	1	2	3	4
<i>Constant</i>	0.232	0.179	-0.048	-0.090
<i>ASSETS</i>	-0.019	-0.016	-	-
D_{FIN}	0.205	0.223*	0.162	0.190
<i>RATE</i>	-0.629*	-0.689**	-0.763**	-0.719**
<i>TREND</i>	-0.130	-0.058	-	-
CAR_2	-	1.231***	-	1.290***
AR_1	1.408***	-	1.473***	-
R squared	0.22	0.27	0.20	0.27
DW	1.57	1.57	1.53	1.53
F-stat	3.71***	5.07***	5.65***	8.32***

*** Significant at 1 percent

** Significant at 5 percent

* Significant at 10 percent

6. Conclusion

Using a sample of 88 IPOs during 1999-2007, this study investigated the underpricing and long run performance of Turkish IPOs. In this period, Turkish IPOs are underpriced by 7.3 percent measured by the market adjusted abnormal return in the first trading day and by 9.7 percent measured by the market adjusted cumulative average abnormal returns at the end of second trading day. This result is in line with the international evidence and previous findings about Turkish IPOs. Markets react to underpricing of financials faster than non financials. Average abnormal returns are not significant in the second trading day for financials while it is for non financials.

Cross sectional regressions showed highly strong evidence that Turkish IPOs are underpriced more during bullish markets and less in bearish. In addition, IPOs are seemed to concentrate on bullish periods. This finding is consistent with the Ritter's (1984) hot issue market. Firm specific variables which are used as proxies for ex ante uncertainty hypothesis of Beatty and Ritter (1986) seem to have minor influence on underpricing. The existence of an investor who buys more than 5 percent of the shares has a negative effect in underpricing. This finding is inconsistent with Rock's (1986) winner's curse hypothesis. Considering the sales methods, fixed price offers are underpriced less than sales at the ISE method. This is parallel to the findings of Kucukkocaoglu (2008). However, book building method does not seem to have a significant effect on underpricing. Using cumulative abnormal returns as dependent variable at the end of second trading day due to the volatility restrictions implemented in ISE does not reveal more evidence for explaining the variation in underpricing.

The study showed that Turkish IPOs underperformed the market significantly by 12.4 percent 12 months after the issue during 1999-2007. The underperformance is higher in non-financials compared to a positive but insignificant market adjusted performance of financials 12 months after the issue. The results of the multivariate regressions showed that firms with higher initial returns perform better 12 months after the issue. This result is inconsistent with Levis's (1993) findings. This positive coefficient can be interpreted as investor optimism continues even 12 months after the issue. It should be underlined that the coefficients might have taken opposite signs in a longer time horizon. 12 months does not seem a very long run while evaluating IPOs.

The results should be evaluated by caution as all IPOs are adjusted by the market return. Though some precaution is taken by adding dummy variable for financials due to the reasons mentioned above, there is no guarantee that other sectors' performance did not deviate significantly from the market. A careful analysis can be done by adjusting the returns of IPOs by sector indices or similar firms in the sector about the same size of the IPOd firms.

Another suggestion might be analyzing the long run performance for more than 12 months. As indicated before, investor optimism seems to be persistent at least for the 12 months after the issue. The variables might take different values if longer run abnormal returns are taken into

account. The effects of the underwriting method and the underwriter's reputation should also be analyzed further.

References

- Aggarwal, R. and P. Rivoli, 1990, Fads in the initial public offering market?, *Financial Management* 19(4), 45-57.
- Aggarwal, R. and R. M. Kunz, 1994, Explaining the underpricing of initial public offerings: Evidence from Switzerland, *Journal of Banking and Finance* 18, 705-723.
- Akerlof, G. A., 1970, The market for "lemons": Quality uncertainty and the market mechanism, *The Quarterly Journal of Economics* 84(3), 488-500
- Aktas, R., M. B. Karan and K. Aydogan, 2003, Forecasting short run performance of initial public offerings in the Istanbul Stock Exchange, *Journal of Entrepreneurial Finance and Business Ventures* 8(1), 69-85.
- Allen, D. E., N. J. Morkel-Kingsbury and W. Piboonthanakiat, 1999, The long run performance of initial public offerings in Thailand, *Applied Financial Economics* 9(3), 215-232(18)
- Arosio, R., S. Paleari and G. Giudici, 2001, The market performance of Italian IPOs in the long-run, EFMA 2001 Lugano Meetings, Available at SSRN: <http://ssrn.com/abstract=269834>
- Beatty, R. P. and Ritter, J. R., 1986, Investment banking, reputation, and the underpricing of initial public offerings, *Journal of Financial Economics* 15(1), 213-232.
- Booth, J. R. and L. Chua, 1996, Ownership dispersion, costly information, and IPO underpricing, *Journal of Financial Economics* 41(2), 291-310.
- Brown, S., and J. Warner, 1985, Using daily stock returns: The case of event studies, *Journal of Financial Economics* 14, 3-31.
- Cai, X., S. L. Guy and B. Mase, 2008, The long-run performance of initial public offerings and its determinants: the case of China, *Review of Quantitative Finance and Accounting* 30(4), 419-432.
- Campbell, J. Y., A. W. Lo, A. C. MacKinlay and R. F. Whitelaw, 1997, *The Econometrics of Financial Markets*, Princeton University Press, 1997 New York University
- Cassia, L., G. Giudici, S. Paleari and R. Redondi, 2004, *Applied Financial Economics* 14(3), 179-194.
- Chi, J. and C. Padgett, 2005, Short-run underpricing and its characteristics in Chinese initial public offering (IPO) markets, *Research in International Business and Finance* 19(1), 71-93.
- Chun, H. and S. C. Smith, 2003, New issues in emerging markets: Determinants, effects, and stock market performance of IPOs in Korea, *Journal of Emerging Market Finance* 2(3), 253-285

- Cigerza, G. C. and J. L. Procianoy, 2007, IPOs in emerging markets: A comparison of Brazil, India and China, Available at SSRN: <http://ssrn.com/abstract=968300>
- Copeland, T. E., J. F. Weston and K. Shastri, 2005, *Financial Theory and Corporate Policy*, Pearson Addison Wesley, USA
- Eijgenhuijsen, H. and R. van der Valk, 1997, Initial public offerings in Mexico and Argentina: Serie Research Memoranda 0009, Free University Amsterdam, Faculty of Economics, Business Administration and Econometrics.
- Ghosh, S., 2004, Revisiting IPO underpricing in India, Available at SSRN: <http://ssrn.com/abstract=703501>
- Ghosh, S., 2005, Underpricing of initial public offerings: The Indian experience, *Emerging Markets Finance and Trade* 41(6), 45-57.
- Hensler, D., 1995, Litigation costs and the underpricing of initial public offerings, *Managerial and Decision Economics* 16, 111-128.
- How, J. C. Y., 2000, Initial and long-run performance of mining IPOs in Australia, *Australian Journal of Management* 25(1), 95-118.
- Ibbotson, R. G., 1975, Price performance of common stock new issues, *Journal of Financial Economics* 2, 235-72.
- Jakobsen, J. and O. Sorensen, 2000, Decomposing and testing long-run returns with an application to initial public offerings in Denmark, Department of Finance, Copenhagen Business School WP 2000-2.
- Keloharju, M., 1993, The winner's curse, legal liability, and the long-run price performance of initial public offerings in Finland, *Journal of Financial Economics* 34(2), 251-277.
- Kiyamaz, H., 2000, The initial and aftermarket performance of IPOs in an emerging market: evidence from Istanbul Stock Exchange, *Journal of Multinational Financial Management* 10, 213-227.
- Kucukkocaoglu G., 2008, Underpricing in Turkey: A comparison of the IPO methods, *International Research Journal of Finance and Economics* 13, 162-181.
- Lee, P.J., S. L. Taylor and T. S. Walter, 1996, Australian IPO pricing in the short and long run, *Journal of Banking and Finance* 20(7), 1189-1210.
- Levis, M., 1993, The long-run performance of initial public offerings: The UK experience 1980-1988, *Financial Management* 22(1), 28-41.
- Lintner, J., 1965, Security prices, risk, and maximal gains from diversification, *The Journal of Finance* 20(4), 587-615.

- Ljungqvist, A., 2004, IPO underpricing: A survey. Handbook in corporate finance: Empirical corporate finance, B. Espen Eckbo, ed., Forthcoming Available at SSRN: <http://ssrn.com/abstract=609422>
- Loughran, T. and J. R. Ritter and K. Rydqvist, 1994, Initial public offerings: International insights, *Pacific-Basin Finance Journal* 2(2-3), 165-199.
- Loughran, T. and J. R. Ritter, 1995, The new issues puzzle, *Journal of Finance* 50(1), 23-51.
- Mcdonald, J. G. and A. K. Fisher, 1972, New issue stock price behavior, *Journal of Finance* 27(1), 97-102.
- Ozdemir, Z. A., 2008, Efficient market hypothesis: evidence from a small open-economy, *Applied Economics* 40, 633-641.
- Ozden , O. E., 2005, The initial and long-run price performance of initial public offerings: The Turkish experience 1990-1997, *Journal of Social Science Research* Fall 2005, University of Texas
- Peter, S., 2007, Performance of initial public offerings and privatized offers. Evidence from a developing country, *Managerial Finance* 33, 798-809.
- Reilly, F. K. and K. Hatfield, 1969, Investor experience with new stock issues, *Financial Analysts Journal* 25(5), 73-80
- Rijckeghem, C. and M. Ucer, 2006, Chronicle of the Turkish financial crisis of 2000-2001, Bogazici University Publications, Istanbul, Turkey
- Ritter, J. R., 1984, The "hot issue" market of 1980, *The Journal of Business* 57(2), 215-240.
- Ritter, J. R., 1991, The long run performance of initial public offerings, *The Journal of Finance* 46(1), 3-27.
- Rock, K., 1986, Why new issues are underpriced, *Journal of Financial Economics* 15, 187-212.
- Ross, S. A., 1976, The arbitrage theory of capital asset pricing, *Journal of Economic Theory* 13, 341-60.
- Rydqvist, K., 1997, IPO underpricing as tax-efficient compensation, *Journal of Banking and Finance* 21(3), 295-313(19).
- Sharpe, W. F., 1964, Capital asset prices: A theory of market equilibrium under conditions of risk, *The Journal of Finance* 19(3), 425-442.
- Shiller, R. J., 1990, Speculative prices and popular models, *The Journal of Economic Perspectives* 4(2), 55-65.

APPENDIX

Table I: The correlation matrix of the variables used in initial returns

	AR_1	CAR_2	ASSETS	AGE	D_{FIN}	PROCEEDS	RATE	D_{BIG}	$D_{METHOD,SALE\ OF\ SHARE}$	$D_{METHOD,CAPITAL\ INCR}$	$D_{SALES,FIXED\ PRICE}$	$D_{SALES,BOOK}$	TRENDLONG	TRENDSHORT
AR_1	1.000													
CAR_2	0.898	1.000												
ASSETS	-0.034	-0.080	1.000											
AGE	0.095	0.055	0.185	1.000										
D_{FIN}	0.175	0.069	0.358	0.104	1.000									
PROCEEDS	0.044	-0.027	0.341	0.318	0.250	1.000								
RATE	-0.021	-0.044	-0.241	-0.277	-0.029	-0.074	1.000							
D_{BIG}	-0.205	-0.142	-0.007	0.116	0.150	0.124	0.113	1.000						
$D_{METHOD,SALE\ OF\ SHARE}$	-0.089	-0.144	0.078	0.071	-0.046	0.137	0.260	0.229	1.000					
$D_{METHOD,CAPITAL\ INCR}$	0.028	0.176	-0.112	-0.153	-0.056	-0.426	-0.312	-0.213	-0.537	1.000				
$D_{SALES,FIXED\ PRICE}$	-0.151	-0.041	0.008	-0.063	-0.044	-0.417	-0.465	0.030	-0.132	0.273	1.000			
$D_{SALES,BOOK}$	0.133	0.027	0.236	0.250	0.333	0.738	0.087	0.165	0.049	-0.386	-0.630	1.000		
TRENDLONG	0.231	0.160	-0.036	0.122	0.275	-0.135	-0.059	0.022	0.018	0.030	0.200	-0.110	1.000	
TRENDSHORT	0.343	0.320	-0.172	-0.105	0.090	-0.041	0.027	-0.123	-0.137	0.152	0.023	-0.025	0.432	1.000

Table II: The correlation matrix of the variables used in long run performance

	$CAR_{12\ months}$	AR_1	CAR_2	TREND	RATE	ASSETS	D_{FIN}
$CAR_{12\ months}$	1.000						
AR_1	0.333	1.000					
CAR_2	0.426	0.901	1.000				
TREND	-0.206	0.056	-0.098	1.000			
RATE	-0.243	0.064	0.011	0.568	1.000		
ASSETS	-0.031	-0.114	-0.118	-0.155	-0.235	1.000	
D_{FIN}	0.182	0.188	0.092	0.078	0.037	0.224	1.000