

# UNDERPRICING IN TURKEY: A COMPARISON OF THE IPO METHODS

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## Abstract

This paper addresses the question of what kind of selling and underwriting procedure might be preferred for controlling the amount and volatility of underpricing in the Istanbul Stock Exchange (ISE). Using 1993-2005 firm and issue data, we compare the three substantially different IPO methods available in the ISE. One is very similar to the *book building mechanism* used in the U.S., another is the *fixed price offer*, and the third one is the *sale through the stock exchange* method. The empirical analysis reveals significant first day underpricing of 7.01% in fixed price offer, 11.47% in book building mechanism, and 15.68% in sale through the stock exchange method. Finally, we also show that fixed price offers can better control the impact of market information on underpricing than sale through the stock exchange method.

Key words: IPOs, underpricing, fixed price offers, book building, sale through the stock exchange

## 1. Introduction

Extensive amount of research from a variety of different markets have documented the presence of first-day underpricing upon the listing of initial public offerings. The evidence is well documented by [Loughran, Ritter, and Rydqvist \(1994\)](#) and [Ritter<sup>1</sup> \(1998\), \(2003\)](#) in many developed and emerging markets. In developed markets, in the absence of restrictions on intra-day price movements, first-day underpricing is observed in broad price bands. However, in emerging markets, in the presence of daily volatility limits, first-day underpricing is observed in narrow price bands. In contrast to the daily price limits, significant positive short run returns are observed in a number of emerging markets and substantial amount of money is “left on the table” by issuers.

Besides empirical evidence, most of the theoretical models explaining IPO underpricing are grouped under four broad headings by [Ljungqvist \(2005\)](#), these are (i) information asymmetry between the investors, the issuing firm and the underwriter, these models assume that one of these parties knows more than the others, (ii) institutional reasons, institutional theories focus on three features of the marketplace: litigation, banks’ price stabilizing activities once trading starts, and taxes, (iii) control considerations, control theories argue that underpricing helps shape the shareholder base so as to reduce intervention by outside investors once the company is public, (iv) behavioral approaches, behavioral theories assume either the presence of ‘irrational’ investors who bid up the price of IPO shares beyond true value, or that issuers suffer from behavioral biases causing them to put insufficient pressure on the underwriting banks to have underpricing reduced. These theoretical models almost always end with the conclusion that the average IPO is undervalued at the offer price, where the initial investors, in most cases, benefit from possessing information by receiving allocations of shares in IPOs and earn the largest first-day returns.

The expectations of issuing firms, investors and underwriters in IPO pricing are considerably different. In an offering, the issuer generally wants to receive the highest possible price to maximize cash flows to the firm. Investors like to purchase shares at a deep discount so that they can realize positive returns

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<sup>1</sup> [Ritter \(1998\), \(2003\)](#) provides an update on the compilation of [Loughran, Ritter, and Rydqvist \(1994\)](#).

in a short investment period. Underwriters, acting as an intermediary between investors and issuing firms, suffer from a dilemma, if an underwriter determines IPO prices too low, where the foreseen amount of money left on the table will be huge, the issuing firm may withdraw or switch to another underwriter. On the other hand, if an underwriter determines IPO prices relatively high, investors will hesitate to buy new issues, which would result in low commissions and an unwanted effort in aftermarket stabilization activities. Underwriters, however, have an incentive to underprice the shares to ensure that they can sell the offering, and, unsurprisingly, there is extensive evidence that IPOs are, on average, underpriced. Hence, pricing of stocks in IPOs may be the most critical stage of the IPO process. More recently, the literature on IPOs, both theoretical and empirical, focuses on the efficiency mechanisms of the following methods for pricing initial public offerings. At the center of this literature, book building, auctions and fixed price offers differ mainly in price-discovery and share allocation process.

(i) Book Building - in which the underwriters do road shows and take non-binding orders from investors before setting the issue price.

(ii) Auctions - in which the company sets a price range to be used as a non-restrictive guideline for investors, then accepts bids, each specifying a number of shares and a price the investor is willing to pay for them, finally, the market-clearing price set by the investors approximates the real price the shares will command in the market.

(iii) Fixed Price Offer - in which the issue price is set first and then orders are taken from investors who typically pay in advance for part or all of the shares that are ordered.

(iv) Sale through the Stock Exchange - in which the sale is initially conducted in the primary market of the stock exchange by a designated underwriter. Those investors who buy the shares in the primary market must wait until the shares trade in the secondary market in order to sell their shares. The price designated at the time of registration with the securities exchange commissions is set as the opening price.

(v) Hybrid Offerings - in which the underwriters combine the preceding IPO methods, and design auction/fixed price, auction/book building and book building/fixed price hybrids. For most hybrids, the most common combination is the book building/fixed price offer, where the underwriter uses the book building method to set the price and allocate shares to institutional and foreign investors, and retain the fixed price offer to the domestic retail investors who do not participate in the price-setting process.

This paper addresses the question of what kind of selling and underwriting procedure might be preferred for controlling the amount and volatility of underpricing in the Istanbul Stock Exchange (ISE). In this regard, we first compare the three IPO methods available in Turkey. One is very similar to the *book building mechanism* used in the U.S., another is the *fixed price offer*, and the third one is the *sale through the stock exchange* method. Then, we estimate a binary probit on the issuer's choice between fixed price offer and sale through the stock exchange method, however, because of the declining importance of the book building mechanism in Turkey, we excluded the book build IPO sample from our binary probit estimations. Finally, we determine the factors that are expected to have an effect on the IPO returns. Our results indicate that, the comparison of the two mechanisms yield that for certain values, namely *first day underpricing*, *IPO amount* and *fractions of equity sold*, fixed price offer outperforms the sale through the stock exchange method. To the best of our knowledge, this is the first empirical study on the comparison between fixed price offer and sale through the stock exchange method in the IPO literature. The uniqueness of the data and the availability of the sale through the stock exchange method in the ISE make it possible to conduct a study on the comparison between these two methods.

The remaining part of this paper is organized in six sections. In the next section, we provide a comparison of the theoretical and empirical research conducted on IPO methods across many countries around the world. In section 3, we describe the three important Turkish IPO market selling procedures. In section 4, we describe the data and the methodology we used in our empirical tests. Section 5 documents the relationship between market conditions and underpricing of IPOs in different time series and the last section concludes.

## 2. Comparison of the IPO methods in the literature: Theory and Evidence

The efficiency of the IPO methods has been the subject of an academic research over a decade, both empirical studies and theoretical models have tried to explain the advantages of one method over another. The argument that is often made in favor of IPO methods is often empirical as well as theoretical. Researchers studying on the efficiency of the IPO methods try to answer the most challenging question, “Which one of the IPO mechanism is the most efficient?”<sup>2</sup>. However, according to our comprehensive literature research, both empirical studies and theoretical models listed in Table 1 have some mixed answers.

### 2.1. Book Building vs. Fixed Price Offer and/or Auctions

Comparison of the IPO methods in the literature goes back to [Benveniste and Spindt<sup>3</sup> \(1988\), \(1989\)](#) and [Spatt and Srivastava \(1991\)](#), they suggest that the American bookbuilding procedure is efficient since it encourages investors to reveal their beliefs about the issue’s value at a cost of initial underpricing. Book building allows investors to collect information about the value of the stock and price the issue more accurately. To compensate the investors who reveal information, underwriter will favor them when allocating shares. However, fixed price mechanism does not utilize any information about realized buyer valuations in setting the issue price and is generally inefficient.

[Loughran, Ritter and Rydqvist \(1994\)](#) present the first international evidence on the short-run and long-run performance of companies going public in many stock markets around the world. They document that the fixed price method is associated with greater underpricing because of the greater probability of the issue failing and the increased uncertainty associated with the longer time delay between offer and issuance time.

[Chowdhry and Sherman \(1996\)](#) point out that two features of fixed price offers tend to lead to greater underpricing, relative to the book building method. The first one is the length of the bidding process, as the time gap between the offer and first day market price widens “price information leakage” occurs, the second one is the common requirement that investors pay in advance for their entire order.

[Benveniste and Busaba \(1997\)](#), extend [Welch’s<sup>4</sup> \(1992\)](#), model of information cascades in investment decisions and present a theoretical comparison of the fixed-price and book-building mechanisms. They exhibit that issuers with a greater concern for risk will prefer a fixed-price offer, because book-building might generate higher expected proceeds, and exclusively provides an opportunity to sell additional shares at full value but it also exposes them to higher risk.

[Ritter \(1998\)](#) demonstrates that countries that use bookbuilding typically have less underpricing than countries using fixed-price offerings, more underpricing under fixed-price offering procedures can be attributed to informational cascades. However, [Loughran, Ritter and Rydqvist \(1994\)](#) and [Ritter \(1998\)](#) point out that IPOs with discretionary allocation (Fixed Price Offering and Book-building) are underpriced more than those with non-discretionary allocation (Offer for sale and Auctions), especially in Auctions. Under discretionary allocation, the first day price increase averaged 37% in fixed price offerings, 12% in book building. Under non-discretionary allocation, the first day price increase averaged of 27% in Offer for sale and 9% in Auctions.

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<sup>2</sup> In terms of controlling the amount and volatility of underpricing, share allocation and pricing.

<sup>3</sup> The literature on underpricing in initial public offerings goes back to [Logue \(1973\)](#), [Ibbotson \(1975\)](#), [Chalk and Peavy \(1987\)](#), [Miller and Reilly \(1987\)](#), [Ritter \(1984\)](#), [Rock \(1986\)](#), [Allen and Faulhaber \(1989\)](#), [Benveniste and Spindt \(1988, 1989\)](#), [Grinblatt and Hwang \(1989\)](#), and [Welch \(1989\)](#). However, the mechanism by which initial issues are sold has largely been ignored until [Benveniste and Spindt \(1988\), \(1989\)](#).

<sup>4</sup> [Welch \(1992\)](#) focuses on the fixed-price procedure used in some non-US countries, and shows that this procedure can cause informational cascades: investors who observe the investment choice made by previous investors can update their beliefs about the value of the issued shares.

[Sherman \(2000\), \(2002\)](#) shows that fixed price offer, can lead to higher underpricing than book building. Contrary to the fixed price offer and the auction method, in book building underwriters discriminate investors in the allocation of shares to establish long-run relationship with intermediates. Book building gives the underwriter greater flexibility in designing a solution that reflects the individual issuer's preferences. By controlling investor access to IPO shares, book building controls both the winner's curse problem that affects discriminatory auctions and the free rider problem that affects uniform price auctions. Book building also reduces uncertainty for both issuers and investors. In a study that covers 47 countries, [Sherman \(2002\)](#) has found that in all countries in which the bookbuilding mechanism has been introduced, pre-existing auction systems have decreased in popularity or disappeared altogether.

[Ljungqvist, Jenkinson and Wilhelm \(2000\)](#) use a unique dataset containing information on 2,051 initial public offerings in 61 stock markets around the world, during the period of 1992-1999. The authors examine the relative direct and indirect costs of offerings carried out by book building and fixed-price methods. They find that, the direct costs of book building are typically twice as large as direct costs for fixed-price offers. Compared to fixed price offerings, book building efforts – though more expensive – produce far less underpricing. Nevertheless, fixed price offering is still an extremely common method that is not likely to be abandoned by the underwriters completely. Compared to book building efforts, fixed price offering is an efficient, low cost way to distribute shares to retail investors, avoiding the high fixed costs of road shows.

[Aorsio, Giudici and Paleari \(2000\), Giudici and Paleari \(2001\)](#) present an empirical study conducted on the Milan Stock Exchange companies between 1985 and 1999. Authors distinguish between fixed-price offers and open-price offers with bookbuilding and find different underpricing levels and statistically significant determinants. They state that if the offering is preceded by book building, the underpricing is significantly lower (8.32 % vs. 28.33% in fixed-price offerings), this method allows the issuing parties to collect information from the institutions and to signal good news or bad news to retailers through the revision of the prospectus price range. Therefore, the cost of raising private information is reduced and the requested underpricing is lower. The evolution of the placing procedure, from fixed price to book building, has considerably improved the efficiency of Italian IPO market.

[Biais and Faugeron-Crouzet \(2002\)](#) analyze and compare the performance of book building, fixed price offering, uniform price auction, internet-based Open IPO mechanism, and an auction like mechanism called the Mise en Vente in France. Conclusions emerging from their analysis are; Fixed price offerings lead to inefficient pricing and winner's curse. Dutch auctions can also lead to inefficiencies, to the extent that they are conducive to tacit collusions by investors. The book building and an auction like mechanism Mise en Vente can lead to optimal information elicitation and price discovery.

[Chahine \(2002\)](#) investigates the relationship between underpricing and the investors' interest prior to and after the IPO day on 305 French issues. Empirical results show that book-built issues have a lower underpricing, on median, but a higher variance level, than the auction-like and fixed-price offerings. Despite the high initial underpricing of some book-built issues, book-building procedure appears to better control the information gathering from investors participating in the offering, and to be a more efficient pricing system than the auction-like procedure.

[Paney \(2004\)](#) examines the initial returns, characteristics of issuers and long run performance of Indian IPOs on a sample of 84 Indian IPOs between 1999 and 2002. In terms of initial returns or underpricing, [Paney \(2004\)](#) finds that fixed price offering yields higher initial returns on average, as compared to book building. In terms of issuer characteristics, [Paney \(2004\)](#) finds that fixed price offering are used by issuers offering large proportion of their capital by raising a small amount of money. In contrast, book building is opted for by issuers, offering small portion of their stocks and mobilizing larger sums of money.

[Kutsuna and Smith \(2004\)](#) present an empirical study conducted on the Japanese IPOs between 1995 and 1999. Using a sample of 163 book-built and 321 auctioned IPOs by JASDAQ companies, authors document that average total issue cost, measured as a percent of aftermarket price, was significantly higher in the book-building regime than in the earlier auction regime. However, when results are weighted by issue size, the estimated aggregate costs of auctioning and book building are similar. This outcome favors book building over auctions for two reasons. First, auction-method estimates do not reflect opportunity costs related to underinvestment. Second, issue cost estimates ignore other benefits of the more-accurate pricing that book building affords.

[Anand \(2005\)](#) examines the differences between book building and Dutch-auction, and shows that the bookbuilding method of offering securities is superior to the Dutch-auction IPOs. Stated by [Anand \(2005\)](#), while the Dutch-auction may seem to lead to efficient price discovery based on investor demand, recent transactions suggest that price discovery is not always accurate and that, indeed, underpricing occurs even in the Dutch auction. Further, even if the Dutch auction is more fair than the bookbuilt process in terms of allocating securities, the Dutch auction can lead to less capital market efficiency overall and can therefore be questioned as a basis for promoting this type of offering.

[Jagannathan and Sherman's \(2005\)](#) research on the efficiency of IPO mechanism show that hybrid bookbuildings<sup>5</sup>, unlike auctions, have proved effective in many different countries, cultures, time periods, and market conditions. [Jagannathan and Sherman \(2005\)](#) propose a new IPO mechanism that could overcome the problems with standard auctions. A method that retains the advantages of bookbuilding, while modifying it to increase transparency.

Although not a direct comparison between book building, auctions and fixed-price offers, [Cornelli and Goldreich<sup>6</sup> \(2001\), \(2003\)](#) examine a unique data set of international book building allocations and find that the underwriter favors both regular investors and investors that supply information on the value of the issue. [Degeorge, Derrien and Womack \(2005\)](#) have presented empirical evidence from France's IPO market that underwriters employing the bookbuilding process implicitly committed to providing more favorable coverage to the companies they took public in the aftermarket. Authors find convincing empirical evidence that in addition to placing the IPO shares with investors, underwriters employing book-building implicitly commit to providing more favorable coverage to the companies they take public in the aftermarket. Specifically, analysts, affiliated with the lead underwriter of the offering, issue more favorable recommendations for recent book-built IPOs than for auctioned offerings.

## **2.2. Fixed Price Offer vs. Book Building and/or Auctions**

The pricing of Initial Public Offerings (IPOs) in the short-run has been analyzed by several theoretical and empirical studies referring to the major international stock markets. Extensive research has revealed that the fixed-price offering all over the world suffer from IPO underpricing especially in these major markets. However, studies conducted by [Busaba and Cheng \(2001\)](#), [Bierbaum and Grimm \(2003\)](#), [Chemmanur and Liu \(2003\)](#), [Hsu and Hung \(2005\)](#) present some evidence on the efficiency of fixed price offering over book building and auctions.

[Busaba and Cheng \(2001\)](#) show that the bookbuilding process elicits much information from informed traders at the IPO stage by promising larger allocation of valuable stocks to investors who truthfully reveal their information, and therefore reduce the impact that such informed traders have in the after-

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<sup>5</sup> In the hybrid bookbuilding offers, all retail investors are allowed to place orders in a public offer tranche, and all have an equal chance of getting shares. The prices, however, are set by professional investors who are given incentives to attend the road show.

<sup>6</sup> [Jenkinson and Jones \(2004\)](#), cast some doubts about the findings of [Cornelli and Goldreich \(2001\)](#) upon the extent of information production during the bookbuilding period.

market trading. In contrast, the fixed price method, that does not elicits such private information at the IPO stage, enables informed traders to use such information in the after-market at the expense of the uninformed traders. In this regard, if the underwriter building a book can not successfully target a subset of the informed investors, a simple fixed price strategy that involves allocating the issue to retail investors produces higher proceeds on average. The comparatively high adverse selection problems associated with the fixed-price method will spill over from the IPO stage to the after-market. This in turn means that liquidity will be relatively more important for IPOs carried out via a fixed-price method than via bookbuilding. Authors show that, compared with a fixed-price offering, the bookbuilding process elicits more information from informed traders at the IPO stage, and therefore reduce adverse selection problems in the after-market trading. However, by the same token bookbuilding may require larger informational rents to be paid at the IPO stage. This suggests that underpricing should be larger for IPOs carried out via bookbuilding than via a fixed-price method.

[Bierbaum and Grimm \(2003\)](#) compare the fixed price and the uniform auction in a game theoretic framework. The comparison of the two mechanisms yields that for certain parameter values, namely a low variance of the asset and, at the same time, a sufficiently high probability of low demand, fixed price method outperforms the auction in terms of revenue. Moreover, the revenue in the fixed price mechanism is typically less volatile than the revenue in the auction.

[Chemmanur and Liu \(2003\)](#) model the effect of costly information production on issuers' choice of a fixed-price offer or a uniform-price auction with exogenous entry of bidders. Their model predicts that IPO auctions will exhibit a significantly lower mean and variance of underpricing compared to fixed-price offerings. This is due to the fact that the offering price in an IPO auction aggregates the information produced by outsiders to a significant degree, so that this offering price is greater for higher intrinsic-value firms and lower for lower intrinsic-value firms in IPO auctions than in fixed-price offerings. At the same time, there is less information production in IPO auctions compared to fixed-price offerings where the offering price is set by insiders to induce the optimal degree of information production, so that a lower amount of information is reflected in the opening price of the shares listed in the stock market. Thus, [Chemmanur and Liu \(2003\)](#) demonstrated that, in many situations, firms will prefer to go public using fixed-price offerings rather than IPO auctions in equilibrium, since such offerings allow the firm to induce the optimal extent of information production.

[Hsu and Hung \(2005\)](#) present an empirical study conducted on the Taiwanese companies between 1996 and 2000. Using a sample of 280 pure fixed-price offers and 84 hybrid auctioned, authors find that, Taiwanese hybrid auctions are associated with less under-pricing and with a lower variance of under-pricing than versus the pure fixed-price offers, but these differences are not statistically different. On the other hand, we find that the market index returns prior to the IPO pricing date have a strong influence on the under-pricing of Taiwanese IPO auctions and of the pure fixed-price offers. Authors provide empirical evidence of how Taiwanese issuers make the choice of IPO method. Taiwanese issuers that float large IPOs, or which have a pricing conflict with underwriters, will likely use a hybrid auction to distribute shares. On the other hand, when the relative risk level of IPO auctions to fixed-price offers has increased, the issuers will likely avoid an IPO auction. Empirical evidence also explains why Taiwanese IPO auctions have lost market share to fixed-price offers. Further results reveal that Taiwanese IPO auctions are not associated with less under-pricing and with a lower variance of under-pricing, nor are they better at incorporating recent market information into the IPO price than the pure fixed-price offers. Authors' examination on issuers' choice of hybrid auctions or fixed-price offers indicates that Taiwanese issuers condition their choice of IPO method not only on firm characteristics, but also on IPO size and on market conditions. This is why Taiwanese issuers prefer a pure fixed-price offer to a hybrid auction are based on market volatility and the pricing conflict. In doing so, under a volatile market where Taiwanese hybrid auctions have become much riskier relative to the pure fixed-price offers, issuers will prefer a pure fixed-price offer to a hybrid auction, resulting in a lower popularity of Taiwanese hybrid auctions.

As listed in Table 1, Fixed Price Offering seems to be the less favorable method comparing to Book building and Auction Methods. It is a fact that, the worldwide introduction of book building method during the 90's has promoted efficiency in the major equity markets. However, [Sherman \(2002\)](#) states that stock markets listing few IPOs each year, fixed price offering is still be the optimal method.

### **2.3. Auctions vs. Book Building and/or Fixed Price Offer**

Using a sample of 108 French firms marketed on the Second Marché between 1984 and 1991, [Leleux and Paliard \(1995\)](#) show that initial returns are significantly higher for firms issuing through the fixed-price procedure than for firms using auction-like procedures. [Leleux and Paliard \(1995\)](#) state that the auction mechanism is associated with less underpricing and thus more efficient, since this procedure is able to incorporate more information from recent market momentum into the pricing of the IPO.

[Beierlein \(2000\)](#) compares the book-building method to two commonly used auction mechanisms, the discriminatory price auction and the uniform price auction in terms of underpricing and the long run performance of IPOs relative to the market. Using data from Japan, Israel and the U.S., author finds evidence that the U.S. book building is less efficient than the auction mechanisms are. Specifically, underpricing is significantly higher in the U.S. than it is in Japan or Israel and bookbuilding appears to incorporate less demand information into the offer price than the auction mechanisms do.

[Bennouri and Falconieri \(2001\)](#) suggest that auction mechanisms are the optimal way to sell new shares because auction procedures are more informationally efficient than bookbuilding. Assuming ex ante uncertainty about the firm true value, then auction mechanisms are able to elicit and incorporate more information from the market as well as from investors into the pricing of IPOs.

[Draho \(2001\)](#) suggests that underpricing in bookbuilt IPOs is due to the uncertainty about the price on the secondary market rather than about the firm value, as most of the literature assume. Nonetheless, his results indicate auction-like mechanisms as the most efficient ones, since they are open to all investors who are moreover required to submit price-quantity bids.

[McDonald \(2001\)](#) examines the efficiency mechanisms of the sealed-bid uniform-price auctions over book building method in a theoretical framework and concludes that the uniform-price auction, due to its generalized Vickrey auction properties, is indeed an efficient auction mechanism especially for the sale of IPOs over the Internet.

[Biais, Bossaert, and Rochet, \(2002\)](#) study the optimal IPO mechanism by which the seller can extract private information to maximize the expected net IPO proceeds. They find that the optimal mechanism they characterize is similar to auction-like IPO procedures used in the U.K. and in France.

[Kaneko and Pettway \(2003\)](#) examine the Japanese initial returns before and after the introduction of book building, and find that underpricing in book building method is significantly higher than auctions, especially during hot markets. Results suggest that the move from auction-priced to underwriter-priced IPOs using book building in Japan has significantly reduced the wealth of issuing companies while increasing the wealth of underwriter-selected investors.

[Derrien and Womack \(2003\)](#), use the French IPO data for the 1992-1998 period and compare the three underwriting/selling mechanisms available on the French market. One is very similar to the book building mechanism used in the United States. Another is a fixed price procedure. The third one is an auction-like procedure. Authors show that the auction procedure is better than the others at controlling underpricing in general as well as the variance of underpricing of the issued shares in "hot" versus "cold" markets. Fixed price offering method is indeed inefficient and leads to greater underpricing compared to IPOs sold through book-building and auctions. However, the main empirical comparison in this paper is between the two main procedures auction and book building. Authors find evidence that during hot markets auctioning is associated with less underpricing than book building. They attribute the result to the auction method's ability to incorporate more information about recent market

performance into the offer price. This result provides empirical support for the theoretical work by [Biais, Bossaerts, and Rochet \(2002\)](#) who suggests the auction procedure is optimal.

In line with the evidence of [Derrien and Womack \(2003\)](#) that an auction procedure is more efficient in incorporating recent market momentum in the offer price compared to fixed price procedure, [Vandemaele \(2003\)](#) uses the French IPO data for the 1984-1995 period and points out the factors that may influence issue procedure choice. Results indicate that, firms facing relatively high valuation uncertainty are high likely to opt for an auction-like procedure and the likelihood of opting for an auction increases as the investment bank reputation associated with the issue decreases.

Although not a direct comparison between auctions, book building and fixed-price offers, studies in [Pettway and Kaneko's \(1996\)](#) examination on Japanese auctions, [Kandel, Sarig and Wohl's, \(1999\)](#) examination on Israeli auctions, and [Liu, Wei and Liaw's \(2003\)](#) examination on Taiwanese auctions seem to suggest that IPO auctions lead to less under-pricing. [Biais and Faugeron-Crouzet \(2001\)](#) show that a uniform price auction can prevent tacit collusion among bidders and can truthfully elicit information from investors in much the same way as book building. [Bulow and Klemperer \(1998\)](#) also show that it can be optimal in an auction to set a price at which there is excess demand.

#### **2.4. Research on IPOs in the Istanbul Stock Exchange (ISE)**

Firms in Turkey may offer their shares to the public through, book building, fixed price offer and sale through the stock exchange method, however, they are mainly underwritten and sold using the fixed-price offering method; a method which is very common world wide is becoming much less common, particularly for more active markets. Recent empirical studies, focused mainly on the initial returns and under pricing, conducted by [Ozer \(1999\)](#), [Kiymaz \(2000\)](#) and [Durukan \(2002\)](#), show that underwriters of the Turkish companies listed in the Istanbul Stock Exchange do not fully incorporate all available information into the IPO offer price. The first day returns of IPOs average approximately 12.41%-13.10%-14.61% respectively, indicating that systematic underpricing largely observed in the ISE. Further, [Ozer \(1999\)](#) finds that IPOs provide significant excess returns in the first three days following the offer. Abnormal returns are the highest on the first day, decrease in the second and the third event days and approximate the market movement after the third day of trading. [Kiymaz \(2000\)](#) finds that these initial returns are related to the size of issuer, rising stock market between the date of public offering and first trading day, institutional ownership and self-issued offering. [Durukan \(2002\)](#) finds that these initial returns are related to the size of issuer, gross proceeds, age of firm, debt level in the firm capital structure in the year prior to IPO, institutional ownership and self-issued offering.

### **3. Methods of Sale in the Istanbul Stock Exchange (ISE)**

The Turkish IPO market gives issuers and underwriters a choice of three different IPO selling mechanisms. Accordingly, firms may offer their shares to the public through one of the following three methods of sale.

#### **3.1. Fixed-Price Offering**

In a fixed price offering method, a fixed price at which the securities are offered is known in advance by the investors. Investors fill in and sign the bid forms and submit them to the underwriter during the period designated in the prospectus. When the bid forms are submitted, investors must deposit the amount corresponding to the demanded shares to the underwriters' account. At the end of the bid collection period, the allocation of shares among investors is conducted through the pro-rata basis. Where the total amount of shares offered to the public is divided by the number of investors until the entire amount of shares has been allocated.

After the bid collection process, the underwriter submits to the issuer a list of the allocation of shares among investors within two business days after the end of the bid collection period. The issuer then approves the allocation list and returns it to the underwriter within two business days. The lists of



bids that are not met are announced by the underwriter and the corresponding amounts are returned immediately to investors. Also, the shares pertaining to bids that have been met are released to investors.

### **3.2. Book Building Method**

In a book building method, price at which securities will be offered is not known in advance to the investor. Only an indicative price range is known and bids above this minimum price are collected. As in the fixed price method, investors submit the bid forms and deposit the corresponding amount to the underwriters' account. At the end of the bid collection period, the allocation of shares is conducted as follows. Starting from the highest-price bid, the bids are transformed into a table showing cumulative bid amounts at each price level. The price level at which the cumulative amount exceeds the amount of shares offered is set as the selling price. All bids above that price are met.

After the bid collection process, the underwriter submits to the issuer a list of the allocation of shares among investors within two business days after the end of the bid collection period. The issuer then approves the allocation list and returns it to the underwriter within two business days. The lists of bids that are not met are announced by the underwriter and the corresponding amounts are returned immediately to investors. Also, the shares pertaining to bids that have been met are released to investors.

### **3.3. Sale through the Stock Exchange**

The initial public offering of an issue using Sale through the Stock Exchange method can be carried out to the Istanbul Stock Exchange within the regulatory framework of the stock exchange after the approval of the Capital Markets Board of Turkey (CMBT). The sale is first conducted in the primary market of the ISE by a designated intermediary institution. Those investors who buy the shares in the primary market must wait until the shares trade in the secondary market in order to sell their shares. The sale can be made through the secondary market of the ISE after fulfilling all the required documentation at least 20 days prior to the offering. The price selected at the time of registration with the CMBT is set as the opening price. From then on, the price of the shares moves within the band determined by the daily limits (+/- 21 %) set by the ISE.

## **4. Data and methodology**

### **4.1. Data**

The sample we analyze is the widest ever examined to carry out a research on IPOs in Turkey. We obtain firm data and issue data from the Istanbul Stock Exchange. Firm data includes book value of assets, book value of equity, book value of debt, sales revenue, net profit, firm age. Issue data include the offer data, number of shares issued, number of days between pricing and first trade, amount raised, offer price, first aftermarket price, and other offering details.

Our sample consists of 217 IPOs from January 1993 through October 2005. Panel A of Table 2 reports the number of IPOs and gross proceeds in Turkish market during this period. Of these 217 IPOs, 149 firms use fixed price offers (69%), 39 firms use Sale through the Stock Exchange (18%), 29 firms use book building (13%) to distribute their shares. The number of IPOs during this period peaked in 2000 than hit the bottom in 2001. As a consequence of the 2001 crisis<sup>7</sup>, the number of IPOs between 2001-2003 totaled only 7. Nevertheless, the book building mechanism which was often used in mid 90's has lost issuers interest in the most recent years, there were 25 total book building offerings in 1994-1995,

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<sup>7</sup> The Turkish economy has suffered from an acute liquidity crisis in 2001. The exchange rate as measured by Turkish Lira/USD depreciated by 50% in a short period of time.

but there have only been 4 since the beginning of 1996<sup>8</sup>. Thus, our main comparisons in this paper are between the Fixed Price Offer and Sale through the Stock Exchange method.

Panel B of Table 2 reports some descriptive statistics of Turkish IPOs from 1993 through 2005 on firms specific and market related characteristics. In line with the evidence on initial returns documented by Ozer (1999), Kiyamaz (2000) and Durukan (2002), IPOs in the sample also suffer from a significant underpricing on an average. The average initial returns computed on the basis of first trading day closing are positive and significant for all the three types of IPO methods, high levels of underpricing observed in sale through the stock exchange with a mean of 15.68%, low levels of underpricing observed in fixed price offers with a mean of 7.01%. The average initial returns computed on the basis of first month closing price are still positive for fixed price offers with a mean of 15.61% and sale through the stock exchange offers with a mean of 58.83%, however, book building offers lead their investors into a systematic under-performance at the same time period.

Panel B also shows that the fractions of equity offered to the public is higher in the sale through the stock exchange method with a mean of 35.32%, than the fixed price offer (25.66%) and book building (24.28%) methods. Firm specific variables such as Net Sales, Total Assets, Total Equity, and Total Debt show that larger firms are more likely use the fixed price offers and smaller firms use sale through the stock exchange and book building methods.

#### 4.2. Choice of IPO method

In this part of the study, we try to answer whether “issue related characteristics”, “issuing firm characteristics” and “market related characteristics” have a stronger influence on issuers’ choice of IPO method. As discussed and confirmed by Derrien and Womack (2003) in French IPOs, and Hsu and Hung (2005) in Taiwanese IPOs, previous market conditions prior to IPOs and some firm characteristics at the time of the IPO have significant impacts on the level and the variability of initial underpricing. To answer the same question in Turkish IPOs, we follow Hsu and Hung’s (2005) methodology and first estimate a binary probit.

$$Y = X\beta + \varepsilon \quad (1)$$

where Y = 0 for the “sale through stock the exchange”

Y = 1 for the “fixed-price offer”

X is the matrix of explanatory variables

$\varepsilon$  is a vector of mean zero independent and identically normally distributed residuals.

The coefficients measure the change in probability of adopting a fixed-price offer.

The univariate results in Panel B of Table 2 indicate that firms have chosen an IPO method in accordance with the “issue related and issuing firm characteristics”. However, binary probit will help us relate issuers’ choice of sale through the stock exchange or fixed-price offer to “issue related characteristics” and/or “issuing firm characteristics” and/or “market related characteristics”.

We used various variables as indicators of different aspects of IPOs and grouped; *Source of Equity Sold, Days between pricing and first trade, Fractions of Equity Sold, IPO Amount and Underwriting Arrangements*, under “issue related characteristics”, and *Age of the Firm, Total Assets, Total Equity, Total Debt, Net Sale and Net Profit*, under “issuing firm characteristics”, and *Daily Return, Adjusted Daily Return, Weekly Return, Adjusted Weekly Return, Monthly Return, Adjusted Monthly Return, Standard Deviation, Market Return and Market Volatility*, under “market related characteristics”.

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<sup>8</sup> Underwriters explain this disinterest as follows: Foreign investors are reluctant to participate in book building method, because they want to know the price in advance.

#### **4.2.1. Issue Related Characteristics**

Source of Equity Sold, Days between pricing and first trade, Fractions of Equity Sold, IPO Amount and Underwriting Arrangements have been used as indicators of “issue related characteristics”.

##### *Source of Equity Sold, (Source\_equity)*

IPOs in the ISE are classified as either the offering of new issues where the equity that is offered to the public are from blocking of pre-emptive rights in a capital increase or the sales of previously issued outstanding shares where the equity that is offered to the public are from the existing shareholders. A dummy variable is employed and takes the value of 0 (zero) if the offering is the sale of the previously issued outstanding shares, and one (1) if it is the offering of new issues.

##### *Days between pricing and first trade, (Days\_price)*

Is the number of calendar days between the day when the offering price is chosen and the IPO date. The natural logarithms of calendar days are used in the statistical tests.

##### *Fractions of Equity Sold, (Fra\_ipo)*

Portions of shares offered to the public.

##### *IPO Amount, (Amount\_ipo)*

Gross proceeds from the IPO stated in inflation adjusted values (1993=100) and the natural logarithm of the inflation adjusted IPO amounts are used in the statistical tests.

##### *Underwriting Arrangements, (Arrangement\_type)*

There are two types of underwriting arrangements in the ISE. The firm-commitment and the best-effort method. In the firm-commitment method, the underwriter guarantees the proceeds of the issuing firm and bears the risk of under subscription. In the best-effort offerings, the underwriter attempts to sell as many of the new shares as possible at an agreed price per share, without purchasing any shares. A dummy variable is employed and takes the value of 0 (zero) if the offering is conducted through best-effort, and one (1) if the is the offering is conducted through firm commitment.

#### **4.2.2. Issuing Firm Characteristics**

Age of the Firm, Total Assets, Total Equity, Total Debt, Net Sales and Net Profit have been used as indicators of “issuing firm characteristics”.

##### *Age of the Firm, (Firm\_age)*

Is the age of the issuing firm at the time of the IPO. The natural logarithms of years are used in the statistical tests.

##### *Total Assets, (Total\_assets)*

Is the book value of total assets of the firm in the year preceding of an IPO. In order to eliminate the inflation affect that may distort the results. All figures are stated in 1993=100 base year and the natural logarithms of amounts are used in the statistical tests.

##### *Total Equity, (Total\_equity)*

Is the book value of total equity of the firm in the year preceding of an IPO. In order to eliminate the inflation affect that may distort the results. All figures are stated in 1993=100 base year and the natural logarithms of amounts are used in the statistical tests.

##### *Total Debt, (Total\_debt)*

Is the book value of total debt of the firm in the year preceding of an IPO. In order to eliminate the inflation affect that may distort the results. All figures are stated in 1993=100 base year and the natural logarithms of amounts are used in the statistical tests.

*Net Sales, (Net\_sales)*

Is the book value of net sales of the firm in the year preceding of an IPO. In order to eliminate the inflation affect that may distort the results. All figures are stated in 1993=100 base year and the natural logarithms of amounts are used in the statistical tests.

*Net Profit, (Net\_profit)*

Is the book value of net profit of the firm in the year preceding of an IPO. In order to eliminate the inflation affect that may distort the results. All figures are stated in 1993=100 base year and the natural logarithms of amounts are used in the statistical tests.

#### **4.2.3. Market Related Characteristics**

Daily Return, Adjusted Daily Return, Weekly Return, Adjusted Weekly Return, Monthly Return, Adjusted Monthly Return, Standard Deviation, Market Return and Market Volatility have been used as indicators of “market related characteristics”.

*Daily Return, (Daily\_ret)*

Daily return of the IPO is defined as the percentage change of the stock price from its offering price to the first trading day closing price.

*Adjusted Daily Return, (AdjDaily\_ret)*

Adjusted daily return of the IPO is defined as the percentage change of the stock price from its offering price to the first trading day closing price with adjustments to the market index returns<sup>9</sup>.

*Weekly Return, (Weekly\_ret)*

Weekly return of the IPO is defined as the percentage change of the stock price from its offering price to the first trading week closing price.

*Adjusted Weekly Return, (AdjWeekly\_ret)*

Adjusted weekly return of the IPO is defined as the percentage change of the stock price from its offering price to the first trading week closing price with adjustments to the market index returns.

*Monthly Return, (Monthly\_ret)*

Monthly return of the IPO is defined as the percentage change of the stock price from its offering price to the first trading month closing price.

*Adjusted Monthly Return, (AdjMonthly\_ret)*

Adjusted monthly return of the IPO is defined as the percentage change of the stock price from its offering price to the first trading month closing price with adjustments to the market index returns.

*Standard Deviation, (Std\_dev)*

The standard deviation of the daily returns of an IPO considering 30 trading days after the offer.

*Market Return, (Mkt\_Ret)*

Market return is calculated as the weighted average of the returns of the market index for the 3 months before the IPO pricing date. The weights are 3 for the most recent month, 2 for the next month and 1 for the third month before the offering. [Hsu and Hung's \(2005\)](#) study in Taiwanese IPOs, shows that previous market returns prior to IPOs have significant impacts on the issuers' choice of IPO method.

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<sup>9</sup> The raw returns have been adjusted for market movements through deducting the corresponding return of the market index from the raw return on a given event day t.

#### *Market Volatility, (Mkt\_Vol)*

Market volatility is the standard deviation of the 1 month return of the market index in the month before the IPO. Hsu and Hung's (2005) study in Taiwanese IPOs, shows that previous market volatility prior to IPOs have significant impacts on the issuers' choice of IPO method.

#### **4.2.4. Probit Results**

In this section, what we expect from binary probit is to help us relate issuers' choice of sale through stock exchange or fixed-price offer to "issue related characteristics" and/or "issuing firm characteristics" and/or "market related characteristics".

Table 3 shows the results of the probit analysis on "issue related characteristics", "issuing firm characteristics" and "market related characteristics". Model 1 of Table 3, relating "issue related characteristics" on the choice of IPO method shows that the coefficients of *Source\_Equity* is positive and very significantly different from zero ( $p=0.0003$ ), suggesting that IPOs using fixed price offers are from the new issues, where the proceeds from an IPO goes to the firm's growth opportunities. The coefficient of *Days\_price* is positive and significantly different from zero ( $p=0.0132$ ), suggesting that as the number of calendar days between pricing and first trade gets longer firms will more likely use fixed price offers. The coefficient *Amount\_ipo* is positive and significantly different from zero ( $p=0.0365$ ), suggesting that firms generating large amounts of proceeds from the IPO are more likely to adopt a fixed price offer. The last coefficient on issue related characteristics, *Arrangement\_type*, is positive and very significantly different from zero ( $p=0.0024$ ), suggesting that most of the fixed price offerings are conducted through firm commitment method.

Model 2 of Table 3, relating "issuing firm characteristics" on the choice of IPO method shows that only the coefficient of *Net\_profit* is negative and significantly different from zero ( $p=0.0026$ ), suggesting that firms earning larger profits tend to use sale through the stock exchange method when offering their shares to the public.

Model 3 of Table 3, relating "market related characteristics" on the choice of IPO method shows that only the coefficients of *Monthly\_ret* and *Adjmonthly\_ret* are negative and significantly different from zero ( $p<0.05$ ), suggesting that firms expecting to generate an upward short term performance on their offering will more likely use sale through the stock exchange method. However, contrary to Hsu and Hung's (2005) study, which shows that previous market returns and volatility prior to IPOs have significant impacts on the issuers' choice of IPO method, *Market Return* and *Market Volatility* variables on Turkish IPOs do not have any significant impacts on the choice of an IPO method.

Model 4 of Table 3, combines "issue related characteristics", "issuing firm characteristics" and "market related characteristics" into a single column. For the issue related characteristics, the results are similar on *Source\_Equity* and *Arrangement\_type* variables. However, *Days\_price* and *Amount\_ipo* variables which were significant in Model 1 became insignificant. The last variable listed on the fourth row of the "issue related characteristics", *Fra\_ipo*, becomes significantly different from zero ( $p=0.0146$ ), suggesting that issuers offering larger portions of their shares to the public use the sale through the stock exchange method. For the "issuing firm characteristics", only the *Firm\_age* variable becomes significantly different from zero ( $p=0.0193$ ), negative coefficient suggests that older firms use the sale through the stock exchange method when offering their shares to the public. For the market related characteristics *Adjmonthly\_ret* becomes insignificant and *Monthly\_ret* remains marginally significantly different from zero ( $p=0.0554$ ).

We assessed the robustness of the estimation results by dropping up to 14 variables from the model to assess the stability of coefficient estimates. First, we dropped 4 variables (*Total Assets*, *Total Equity*, *Total Debt* and *Net Sales*) from the model where the Pearson correlation coefficients had values greater than .20, than one variable at a time and in combination, however, dropping these variables from the model yielded similar results but lower McFadden R-squared values for the remaining variables.

Our results on issuers' choice of IPO method demonstrate that the variables of "issue related characteristics" have strong influence on the choice between fixed price offer and sale through the stock exchange method. Model 1, relating "issue related characteristics" to issuers' choice of IPO method, has a McFadden R-squared of 19.33%. Model 2, relating "issuing firm characteristics" to issuers' choice of IPO method, has a McFadden R-squared of 13.30%. Model 3, relating "market related characteristics" to issuers' choice of IPO method, has a McFadden R-squared of 15.39%. Model 4, relating all variables to issuers' choice of IPO method, has a McFadden R-squared of 64.44%, which is significantly higher than [Hsu and Hung's \(2005\)](#) Pseudo R-squared of 18.00%.

## 5. Underpricing of IPOs in Fixed-Price Offer and Sale through the Stock Exchange Methods

### 5.1. First Day Underpricing

Following the probit analysis, the second stage aims to determine the factors that are expected to have an effect on the IPO returns. In order to test the effects of different characteristics on the underpricing level, we identified the "issue related characteristics", "issuing firm characteristics" and "market related characteristics" as dependent variables. From the univariate results in Panel B of Table 2, we expect the underpricing to be lower in IPOs with fixed price offers. Therefore, the *Adjusted Daily Return* values have been regressed against these variables.

Table 4 shows the underpricing levels, by "issue related characteristics" in Regression 1, "issuing firm characteristics" in Regression 2, and "market related characteristics" in Regression 3. Regression 4, combines these characteristics into a single column. Regression 1 and 4 of Table 4 shows that the coefficient of *Fixed Price Offer* is negatively related to *Adjusted Daily Return* indicating that the average underpricing is lower in fixed price offers than sale through the stock exchange method, but the difference is not significantly different from zero ( $p=0.4747$ ).

The *Total Debt* variable under the "issuing firm characteristics" is marginally significantly different from zero ( $p=0.055$ ), a positive coefficient indicates that underpricing is higher on firms with larger debts.

The only variable that is significantly different from zero in these regressions, is the *Market Return* ( $p=0.0000$ ). As pointed out by [Derrien and Womack \(2003\)](#), [Hsu and Hung \(2005\)](#), market return and market volatility prior to the IPO date can predict underpricing and the variance of underpricing. [Derrien and Womack \(2003\)](#), have shown that market return, a proxy for the overall market's price momentum in the 3 months prior to an offering, is a significant ex ante predictor of the level of underpricing in French IPOs. Consistent with their findings on French and Taiwanese IPOs, the *Market Return* variable in Turkish IPOs has a significant impact on the underpricing of the issues.

### 5.2. Short-run Market Performance of IPOs

As the price of the shares moves within the band determined by the daily limits ( $\pm 21\%$ ) set by the ISE. We believe that the daily price limits imposed on the securities traded in the ISE could affect the level of first day underpricing results. We extended the first day underpricing calculations to the first week and first month returns.

We first carry out the results of Regression 4 of Table 4, to the Regression 1 of Table 5 for comparison purposes. Then in Regression 2 of Table 5, we regressed the *Adjusted Weekly Return* values against the variables of "issue related characteristics", "issuing firm characteristics" and "market related characteristics". Results of the analyses show that, coefficient of *Fixed Price Offer* is negatively related to *Adjusted Weekly Returns* indicating that the average underpricing is lower in fixed price offers than sale through the stock exchange method, and contrary to the *Adjusted Daily Return* results listed in Regression 1, the difference becomes significantly different from zero ( $p=0.0196$ ). *Total\_debt* variable, which is marginally significantly different from zero in Regression 1 becomes significantly

different from zero, a positive coefficient still indicates underpricing is higher on firms with larger debts. As discussed in the previous section, *Mkt\_ret* is still significantly different from zero. The last variable which is marginally significantly different from zero ( $p=0.0518$ ) is the *Net\_profit* variable.

In Regression 3 of Table 5, we regressed the *Adjusted Monthly Return* values against the variables of “issue related characteristics”, “issuing firm characteristics” and “market related characteristics”. Results of the analyses show that, coefficient of *Fixed Price Offer* is still negatively related to *Adjusted Returns* indicating that the average underpricing is lower in fixed price offers than sale through the stock exchange method, and contrary to the *Adjusted Daily Return* results listed in Regression 1, the difference becomes marginally significantly different from zero ( $p=0.0540$ ). *Total\_debt* variable, which is marginally significantly different from zero in Regression 1, becomes significantly different from zero. As discussed in the previous section, *Mkt\_ret* is still significantly different from zero. The last variable, *Net\_profit*, which was marginally significantly different from zero in Regression 2, becomes significantly different from zero in Regression 3.

## 6. Conclusion

Recent empirical studies on Turkish IPOs conducted by Ozer (1999), Kiymaz (2000) and Durukan (2002) show that underwriters of the Turkish companies listed in the Istanbul Stock Exchange do not fully incorporate all available information into the IPO offer price. The first day returns of IPOs average approximately 12.41%-13.10%-14.61% respectively, indicating that systematic underpricing largely observed in the ISE. In line with the evidence on these recent empirical findings, Turkish IPOs in our study also suffer from a significant underpricing on an average. The average initial returns computed on the basis of first trading day closing are positive and significant for all the three types of IPO methods, high levels of underpricing observed in sale through the stock exchange with a mean of 15.68%, in book building with a mean of 11.47% and low levels of underpricing observed in fixed price offers with a mean of 7.01%. It is also found that issues offered to the public by sale through the stock exchange not only provide significantly higher first-day return, but also yield higher short-run performance up to a month after the first day of trading. Investors who buy these issues at market close on the first day of the trading date and hold them for one month can earn more than 25 percent on their initial investment.

The efficiency of the IPO methods has been the subject of an academic research over a decade, both empirical studies and theoretical models have tried to explain the advantages of one method over another. The argument that is often made in favor of IPO methods is often empirical as well as theoretical. Researchers studying on the efficiency of the IPO methods try to answer the most challenging question, “Which one of the IPO mechanism is the most efficient?”.

Our results on issuers’ choice of IPO method demonstrate that the variables of *Source of Equity Sold*, *Days between pricing and first trade*, *IPO Amount*, *Underwriting Arrangements* under “issue related characteristics”, *Net profit* under “issuing firm characteristics”, *Monthly Return*, *Adjusted Monthly Return* under “market related characteristics” have strong influence on the choice between fixed price offer and sale through the stock exchange method. However, contrary to Hsu and Hung’s (2005) study, which shows that previous market returns and volatility prior to IPOs have significant impacts on the issuers’ choice of IPO method, *Market Return* and *Market Volatility* variables on Turkish IPOs do not have any significant impacts on the choice of an IPO method.

Following the results on issuers’ choice of IPO method between fixed price offer and sale through the stock exchange method, we next determine the factors that are expected to have an effect on the IPO returns. *Market Return* variable under the “market related characteristics” has a significant impact on the underpricing of the issues. As pointed out by Derrien and Womack (2003), Hsu and Hung (2005), market return and market volatility prior to the IPO date can predict underpricing and the variance of underpricing. Derrien and Womack (2003), have shown that market return, a proxy for the overall market’s price momentum in the 3 months prior to an offering, is a significant ex ante predictor of the level of underpricing in French IPOs. Consistent with their findings on French and Taiwanese IPOs,

market returns prior to IPOs confirm that firms prefer to go public in “hot markets” and the *Market Return* variable, calculated as the weighted average of the returns of the market index for the 3 months before the IPO pricing date, in Turkish IPOs has a significant impact on the underpricing of the issues.

The literature on the efficiency of the IPO methods suggests that, fixed price offering seems to be the less favorable method comparing to book building and auction methods across many countries around the world. However, as stated by [Sherman \(2002\)](#), stock markets listing few IPOs each year, i.e. Istanbul Stock Exchange, fixed price offering is still be the optimal method. At last, our results indicate that the comparison of the two mechanisms yield that for certain values, namely *first day underpricing, IPO amount and fractions of equity sold*, fixed price method outperforms the sale through the stock exchange method.



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**Table 1****Comparison of the IPO methods in the literature: Empirical Studies and Theoretical Models.**

	<b>Empirical Studies and Theoretical Models presenting some evidence on the efficiency of</b>		
	<b>Book Building Over</b>	<b>Fixed Price Offer Over</b>	<b>Auctions Over</b>
<b>Benveniste and Spindt, (1988), (1989)</b>	Fixed Price Offer		
<b>Spatt and Srivastava, (1991)</b>	Fixed Price Offer		
<b>Loughran, Ritter and Rydqvist, (1994)</b>	Fixed Price Offer		
<b>Chowdhry and Sherman, (1996)</b>	Fixed Price Offer		
<b>Benveniste and Busaba, (1997)</b>	Fixed Price Offer		
<b>Ritter, (1998)</b>	Fixed Price Offer		Book Building and Fixed Price Offer
<b>Sherman, (2000), (2002)</b>	Fixed Price Offer and Auctions		
<b>Ljungqvist, Jenkinson and Wilhelm, (2000)</b>	Fixed Price Offer		
<b>Aorsio, Giudici and Paleari, (2000)</b>	Fixed Price Offer		
<b>Guidici and Paleari, (2001)</b>	Fixed Price Offer		
<b>Biais and Faugeron-Crouzet, (2002)</b>	Fixed Price Offer		Fixed Price Offer
<b>Chahine, (2002)</b>	Fixed Price Offer and Auctions		
<b>Pandey, (2004)</b>	Fixed Price Offer		
<b>Kutsuna and Smith, (2004)</b>	Auctions		
<b>Anand, (2005)</b>	Auctions		
<b>Jagannathan and Sherman (2005)</b>	Auctions		
<b>Busaba and Cheng, (2002)</b>		Book Building	
<b>Bierbaum and Grimm, (2003)</b>		Auctions	
<b>Chemmanur and Liu, (2003)</b>		Auctions	
<b>Hsu and Hung, (2005)</b>		Auctions	
<b>Leleux and Paliard, (1995)</b>			Fixed Price Offer
<b>Beierlein, (2000)</b>			Book Building
<b>Bennouri and Falconieri, (2001)</b>			Book Building
<b>Draho, (2001)</b>			Book Building
<b>McDonald, (2001)</b>			Book Building
<b>Biais, Bossaert and Rochet, (2002)</b>			Book Building and Fixed Price Offer
<b>Kaneko and Pettway, (2003)</b>			Book Building
<b>Derrien and Womack, (2003)</b>			Book Building
<b>Vandemaele, (2003)</b>			Fixed Price Offer

**Table 2****Panel A – Initial Public Offerings Between 1993-2005****Distribution of IPOs**

<b>Year</b>	<b>Number of Companies</b>	<b>Fixed Price Offer</b>	<b>Sale through the Stock Exchange</b>	<b>Book Building</b>	<b>Nominal Value Thousand US\$</b>	<b>Amount Sold Thousand US\$</b>
<b>1993</b>	16	1	15	-	18.130	152.447
<b>1994</b>	25	5	2	18	24.419	270.480
<b>1995</b>	29	16	6	7	44.440	246.783
<b>1996</b>	27	24	3	-	34.626	167.922
<b>1997</b>	29	28	-	1	66.091	420.377
<b>1998</b>	20	19	1	-	66.998	383.348
<b>1999</b>	10	8	2	-	52.391	87.413
<b>2000</b>	35	34	1	-	157.690	2.809.532
<b>2001</b>	1	1	-	-	231	243
<b>2002</b>	4	3	1	-	17.062	56.467
<b>2003</b>	2	-	2	-	1.958	11.252
<b>2004</b>	12	9	2	1	107.114	482.575
<b>2005</b>	7	1	4	2	18.436	472.107
<b>Total</b>	<b>217</b>	<b>149</b>	<b>39</b>	<b>29</b>	<b>609.586</b>	<b>5.560.946</b>

Our sample consists of 217 IPOs from January 1993 through October 2005. Of these 217 IPOs, 149 firms use fixed price offers (69%), 39 firms use Sale through the Stock Exchange (18%), 29 firms use book building (13%) to distribute their shares.

Table 2

## Panel B - Descriptive statistics of Turkish IPOs from 1993 through 2005

## IPO/Firm Characteristics

	Fixed Price Offer			Sale through the Stock Exchange			Book Building		
	Mean	Median	Std. Dev	Mean	Median	Std. Dev	Mean	Median	Std. Dev
<b>IPO Amount (\$ Thousand)</b>	\$29,873.40	\$8,121.48	\$147,300.88	\$6,593.29	\$3,141.03	\$6,848.51	\$12,177.25	\$10,969.42	\$9,009.70
<b>IPO Amount (TL Million) 1993=100</b>	TL3,864.42	TL932.96	TL20,382.01	TL760.38	TL363.32	TL764.26	TL1,415.19	TL1,264.89	TL989.16
<b>Fractions of Equity Sold</b>	25.70%	20.00%	16.47%	35.32%	20.00%	30.98%	25.16%	17.45%	17.52%
<b>Days between pricing and first trade</b>	10.48	8.00	9.76	8.74	7.00	5.20	22.46	14.00	25.86
<b>Net Sales (\$ Thousand)</b>	\$105,314.90	\$275,416.00	\$35,601.75	\$64,325.92	\$37,604.76	\$70,092.40	\$49,556.20	\$30,864.70	\$55,182.60
<b>Total Assets (\$ Thousand)</b>	\$110,256.10	\$29,454.50	\$34,694.15	\$59,424.28	\$26,463.61	\$75,335.78	\$49,880.90	\$31,384.80	\$66,969.10
<b>Total Debt (\$ Thousand)</b>	\$88,106.70	\$13,515.80	\$33,991.03	\$24,977.10	\$4,882.57	\$45,193.57	\$40,494.80	\$17,538.90	\$65,113.30
<b>Total Equity (\$ Thousand)</b>	\$31,726.20	\$13,642.70	\$6,166.32	\$23,346.23	\$8,131.30	\$39,599.34	\$15,616.10	\$12,119.90	\$14,063.80
<b>Net Profit (\$ Thousand)</b>	\$4,598.90	\$2,643.70	\$2,515.26	\$8,502.50	\$4,310.94	\$11,258.20	\$5,642.70	\$3,213.70	\$6,262.10
<b>Net Sales (TL Million) 1993=100</b>	TL18,501.93	TL5,319.84	TL57,236.42	TL9,206.48	TL5,549.39	TL9,854.26	TL9,543.55	TL6,246.55	TL8,658.78
<b>Total Assets (TL Million) 1993=100</b>	TL18,483.04	TL5,654.33	TL54,827.08	TL8,491.71	TL4,158.13	TL10,870.57	TL9,190.56	TL6,144.97	TL10,875.36
<b>Total Debt (TL Million) 1993=100</b>	TL13,137.25	TL2,008.76	TL50,994.20	TL4,943.86	TL1,575.01	TL7,026.61	TL6,334.71	TL2,755.82	TL10,241.14
<b>Total Equity (TL Million) 1993=100</b>	TL5,345.79	TL2,331.99	TL9,669.44	TL3,383.26	TL1,199.95	TL5,940.71	TL2,855.85	TL2,087.08	TL2,062.17
<b>Net Profit (TL Million) 1993=100</b>	TL766.33	TL472.05	TL3,995.78	TL1,222.66	TL677.36	TL1,625.31	TL1,032.17	TL638.28	TL974.66
<b>Age of the Firm</b>	17.19	12.84	17.42	17.11	17.32	15.45	19.36	16.70	12.16
<b>1st Day Return (underpricing)</b>	7.13%	7.67%	14.61%	15.68%	10.91%	18.75%	10.61%	6.20%	40.40%
<b>1st Day Adjusted Return</b>	7.66%	7.22%	14.74%	15.88%	12.15%	18.21%	10.62%	6.46%	40.94%
<b>1st Week Return</b>	10.11%	0.96%	32.81%	42.58%	25.94%	55.96%	15.30%	5.74%	59.33%
<b>1st Week Adjusted Return</b>	9.70%	2.01%	32.12%	40.47%	26.95%	57.06%	14.51%	2.98%	60.13%
<b>1st Month Return</b>	15.06%	0.00%	60.75%	58.83%	36.36%	72.67%	8.25%	-14.71%	72.90%
<b>1st Month Adjusted Return</b>	11.26%	-2.88%	56.39%	43.23%	36.20%	64.98%	4.30%	-6.48%	72.52%
<b>1st Year Return</b>	16.58%	-28.29%	121.22%	101.00	38.89	212.43	20.12%	-12.12%	104.53%
<b>1st Year Adjusted Return</b>	-24.04%	-29.29%	116.09%	-13.23	-67.52	191.21	-50.63%	-71.52%	89.61%
<b>Market Return prior to IPO</b>	6.66%	6.07%	11.05%	8.34%	7.09%	9.39%	6.50%	5.61%	7.67%
<b>Market Volatility prior to IPO</b>	15.40%	14.80%	4.77%	13.58%	13.93%	3.49%	15.64%	13.76%	6.24%

*IPO Amount*, is the gross proceeds from the IPO. *Fractions of Equity Sold*, is the portions of shares offered to the public. *Days between pricing and first trade*, is the number of calendar days between the day when the offering price is chosen and the IPO date. *Net Sales, Total Assets, Total Debt, Total Equity, Net Profit* are from the book values of the firm in the year preceding of an IPO. *Age of the Firm*, is the age of the issuing firm at the time of the IPO. *1st Day Return, 1st Week Return, 1st Month Return and 1st YearReturn* of the IPO is defined as the percentage change of the stock price from its offering price to the first trading day, first trading week, first trading month and first trading year's closing price. *1st Day Adjusted Return, 1st Week Adjusted Return, 1st Month Adjusted Return and 1st Year Adjusted Return*, of the IPO is defined as the percentage change of the stock price from its offering price to the first trading day, first trading week and first trading month's closing price with adjustments to the market index returns. *Market Return prior to IPO*, is calculated as the weighted average of the returns of the market index for the 3 months before the IPO pricing date. The weights are 3 for the most recent month, 2 for the next month and 1 for the third month before the offering. *Market Volatility*, is the standard deviation of the 1 month return of the market index in the month before the IPO. All amounts stated in USD and inflation adjusted values (1993=100) are displayed for comparison purposes. However, the natural logarithms of the inflation adjusted amounts are used in the statistical tests.

Table 3

Probit analysis of the choice between Fixed Price Offer and Sale through the Stock Exchange

	Model 1 Issue related characteristics	Model 2 Issuing firm characteristics	Model 3 Market related characteristics	Model 4 All variables
<b>Intercept</b>	-5.4652 (0.0015)	-1.1343 (0.5482)	0.7652 (0.1834)	-0.9312 (0.8974)
<i>Source_Equity</i>	0.9484 <b>(0.0003)</b>			2.9213 <b>(0.0216)</b>
<i>Days_price</i>	0.6702 <b>(0.0132)</b>			1.5352 (0.0653)
<i>Fra_ipo</i>	-0.0943 (0.8732)			-12.6222 <b>(0.0146)</b>
<i>Amount_ipo</i>	0.2035 <b>(0.0365)</b>			0.0019 (0.9954)
<i>Arrangement_type</i>	1.2384 <b>(0.0024)</b>			5.8801 <b>(0.0056)</b>
<i>Firm_age</i>		-0.1015 (0.4443)		-1.3607 <b>(0.0193)</b>
<i>Total_assets</i>		0.4602 (0.3570)		-1.7404 (0.0855)
<i>Total_equity</i>		0.4087 (0.2709)		1.1589 (0.0713)
<i>Total_debt</i>		-0.0501 (0.7877)		0.4969 (0.2358)
<i>Net_sales</i>		0.0682 (0.6484)		0.2530 (0.5692)
<i>Net_profit</i>		-0.8248 <b>(0.0026)</b>		-0.1529 (0.8402)
<i>Daily_ret</i>			2.1559 (0.6578)	-11.1361 (0.4763)
<i>Adjdaily_ret</i>			-1.7835 (0.7021)	15.9541 (0.3360)
<i>Weekly_ret</i>			-0.8641 (0.7233)	3.8172 (0.5643)
<i>Adjweekly_ret</i>			-0.3899 (0.8682)	-6.8622 (0.3177)
<i>Monthly_ret</i>			-1.4694 <b>(0.0338)</b>	-4.3189 <b>(0.0578)</b>
<i>Adjmonthly_ret</i>			-1.5506 <b>(0.0465)</b>	-3.8718 (0.0819)
<i>Std_dev</i>			-2.8477 (0.6587)	-13.7519 (0.5542)
<i>Mkt_ret</i>			0.5669 (0.6934)	4.6958 (0.4030)
<i>Mkt_vol</i>			3.9102 (0.1984)	2.4737 (0.6932)
<b>McFadden R-squared</b>	19.33%	13.30%	15.39%	64.44%



*Source of Equity Sold*, (*Source\_Equity*), a dummy variable is employed and takes the value of 0 (zero) if the offering is the sale of the previously issued outstanding shares, and one (1) if it is the offering of new issues. *Days between pricing and first trade*, (*Days\_price*), is the number of calendar days between the day when the offering price is chosen and the IPO date. *Fractions of Equity Sold*, (*Fra\_ipo*), is the portions of shares offered to the public. *IPO Amount*, (*Amount\_ipo*), is the gross proceeds from the IPO. *Underwriting Arrangements*, (*Arrangement\_type*), a dummy variable is employed and takes the value of 0 (zero) if the offering is conducted through best-effort, and one (1) if the offering is conducted through firm commitment. *Age of the Firm*, (*Firm\_age*), is the age of the issuing firm at the time of the IPO. *Total Assets*, (*Total\_assets*), *Total Equity*, (*Total\_equity*), *Total Debt*, (*Total\_debt*), *Net Sales*, (*Net\_sales*), *Net Profit*, (*Net\_profit*), are from the book values of the firm in the year preceding of an IPO. *Daily Return*, (*Daily\_ret*), *Weekly Return*, (*Weekly\_ret*), *Monthly Return*, (*Monthly\_ret*) of the IPO is defined as the percentage change of the stock price from its offering price to the first trading day, first trading week and first trading month's closing price. *Adjusted Daily Return*, (*AdjDaily\_ret*), *Adjusted Weekly Return* (*AdjWeekly\_ret*), *Adjusted Monthly Return*, (*AdjMonthly\_ret*), of the IPO is defined as the percentage change of the stock price from its offering price to the first trading day, first trading week and first trading month's closing price with adjustments to the market index returns. *Standard Deviation*, (*Std\_dev*), is the standard deviation of the daily returns of an IPO considering 30 trading days after the offer. *Market Return*, (*Mkt\_Ret*), is calculated as the weighted average of the returns of the market index for the 3 months before the IPO pricing date. The weights are 3 for the most recent month, 2 for the next month and 1 for the third month before the offering. *Market Volatility*, (*Mkt\_Vol*) is the standard deviation of the 1 month return of the market index in the month before the IPO. In order to eliminate the inflation affect that may distort the results the natural logarithms of the inflation adjusted amounts (1993=100) are used in the statistical tests. P-values are reported under the coefficient estimates. Also reported is the McFadden R-squared.

Table 4

## Results of multiple regression analysis – First Day Underpricing

	Regression 1	Regression 2	Regression 3	Regression 4
	Issue related characteristics	Issuing firm characteristics	Market related characteristics	All variables
<b>Intercept</b>	0.2347 (0.1742)	0.0363 (0.9153)	0.0384 (0.4250)	0.2435 (0.3665)
<i>Ipo_Method (Fixed Price Offer)</i>	-0.0653 (0.1328)			-0.0481 (0.4747)
<i>Source_equity</i>	-0.0117 (0.6862)			-0.0597 (0.0604)
<i>Days_price</i>	-0.0772 (0.2110)			-0.0626 (0.4266)
<i>Fra_ipo</i>	0.0503 (0.5284)			0.0605 (0.7302)
<i>Amount_ipo</i>	0.0087 (0.3949)			0.0038 (0.7282)
<i>Arrangement_type</i>	-0.0768 (0.2760)			-0.0796 (0.4837)
<i>Firm_age</i>		0.0110 (0.3640)		0.0221 (0.1689)
<i>Total_assets</i>		-0.0177 (0.6461)		-0.0260 (0.6338)
<i>Total_equity</i>		-0.0084 (0.7639)		0.0055 (0.9002)
<i>Total_debt</i>		0.0193 (0.1765)		0.0336 ( <b>0.0553</b> )
<i>Net_sales</i>		0.0155 (0.5437)		0.0248 (0.2662)
<i>Net_profit</i>		-0.0068 (0.7378)		-0.0470 (0.0981)
<i>Mkt_ret</i>			0.4292 ( <b>0.0001</b> )	0.6166 ( <b>0.0000</b> )
<i>Mkt_vol</i>			0.1523 (0.5739)	0.0148 (0.9712)
<b>Adj. R-squared</b>	7.15%	5.00%	8.50%	17.20%

*Ipo\_Method (Fixed Price Offer)*, a dummy variable is employed and takes the value of 0 (zero) if the offering is a sale through the stock exchange method, and one (1) if it is the offering is a fixed price offer, *Source of Equity Sold*, (*Source\_equity*), a dummy variable is employed and takes the value of 0 (zero) if the offering is the sale of the previously issued outstanding shares, and one (1) if it is the offering of new issues. *Days between pricing and first trade*, (*Days\_price*), is the number of calendar days between the day when the offering price is chosen and the IPO date. *Fractions of Equity Sold*, (*Fra\_ipo*), is the portions of shares offered to the public. *IPO Amount*, (*Amount\_ipo*), is the gross proceeds from the IPO. *Underwriting Arrangements*, (*Arrangement\_type*), a dummy variable is employed and takes the value of 0 (zero) if the offering is conducted through best-effort, and one (1) if the is the offering is conducted through firm commitment. *Age of the Firm*, (*Firm\_age*), is the age of the issuing firm at the time of the IPO. *Total Assets*, (*Total\_assets*), *Total Equity*, (*Total\_equity*), *Total Debt*, (*Total\_debt*), *Net Sales*, (*Net\_sales*), *Net Profit*, (*Net\_profit*), are from the book values of the firm in the year preceding of an IPO. *Market Return*, (*Mkt\_Ret*), is calculated as the weighted average of the returns of the market index for the 3 months before the IPO pricing date. The weights are 3 for the most recent month, 2 for the next month and 1 for the third month before the offering. *Market Volatility*, (*Mkt\_Vol*) is the standard deviation of the 1 month return of the market index in the month before the IPO. All tests are conducted under  $\alpha = 1\%$  significance level. P-values are reported under the coefficient estimates. Also reported is the Adjusted R-squared.

Table 5

## Results of multiple regression analysis – Short-run Market Performance of IPOs

	Regression 1 Adjusted Daily Return	Regression 2 Adjusted Weekly Return	Regression 3 Adjusted Monthly Return
<b>Intercept</b>	0.2435 (0.3665)	1.1980 (0.0539)	1.6919 (0.1606)
<i>Ipo_Method (Fixed Price Offer)</i>	-0.0481 (0.4747)	-0.2720 <b>(0.0196)</b>	-0.3661 <b>(0.0540)</b>
<i>Source_equity</i>	-0.0597 (0.0604)	-0.0009 (0.9891)	-0.0462 (0.7153)
<i>Days_price</i>	-0.0626 (0.4266)	-0.0171 (0.8706)	0.0239 (0.8527)
<i>Fra_ipo</i>	0.0605 (0.7302)	-0.5273 (0.1335)	-0.8239 (0.1686)
<i>Amount_ipo</i>	0.0038 (0.7282)	-0.0208 (0.4380)	-0.0805 (0.1341)
<i>Arrangement_type</i>	-0.0796 (0.4837)	0.1229 (0.5163)	0.0814 (0.8302)
<i>Firm_age</i>	0.0221 (0.1689)	-0.0088 (0.7806)	-0.0029 (0.9579)
<i>Total_assets</i>	-0.0260 (0.6338)	-0.2251 (0.0673)	-0.3399 (0.0699)
<i>Total_equity</i>	0.0055 (0.9002)	0.1209 (0.2774)	0.3243 (0.0636)
<i>Total_debt</i>	0.0336 <b>(0.0553)</b>	0.1294 <b>(0.0003)</b>	0.1712 <b>(0.0033)</b>
<i>Net_sales</i>	0.0248 (0.2662)	0.0299 (0.5052)	0.0439 (0.4955)
<i>Net_profit</i>	-0.0470 (0.0981)	-0.1054 <b>(0.0518)</b>	-0.2392 <b>(0.0274)</b>
<i>Mkt_ret</i>	0.6166 <b>(0.0000)</b>	1.1373 <b>(0.0015)</b>	2.1009 <b>(0.0039)</b>
<i>Mkt_vol</i>	0.0148 (0.9712)	0.7178 (0.3923)	2.6311 (0.0967)
<b>Adj. R-squared</b>	17.20%	17.95%	18.98%

*Ipo\_Method (Fixed Price Offer)*, a dummy variable is employed and takes the value of 0 (zero) if the offering is a sale through the stock exchange method, and one (1) if it is the offering is a fixed price offer, *Source of Equity Sold*, (*Source\_equity*), a dummy variable is employed and takes the value of 0 (zero) if the offering is the sale of the previously issued outstanding shares, and one (1) if it is the offering of new issues. *Days between pricing and first trade*, (*Days\_price*), is the number of calendar days between the day when the offering price is chosen and the IPO date. *Fractions of Equity Sold*, (*Fra\_ipo*), is the portions of shares offered to the public. *IPO Amount*, (*Amount\_ipo*), is the gross proceeds from the IPO stated in USD. *Underwriting Arrangements*, (*Arrangement\_type*), a dummy variable is employed and takes the value of 0 (zero) if the offering is conducted through best-effort, and one (1) if the offering is conducted through firm commitment. *Age of the Firm*, (*Firm\_age*), is the age of the issuing firm at the time of the IPO. *Total Assets*, (*Total\_assets*), *Total Equity*, (*Total\_equity*), *Total Debt*, (*Total\_debt*), *Net Sales*, (*Net\_sales*), *Net Profit*, (*Net\_profit*), are from the book values of the firm in the year preceding of an IPO. *Market Return*, (*Mkt\_Ret*), is calculated as the weighted average of the returns of the market index for the 3 months before the IPO pricing date. The weights are 3 for the most recent month, 2 for the next month and 1 for the third month before the offering. *Market Volatility*, (*Mkt\_Vol*) is the standard deviation of the 1 month return of the market index in the month before the IPO. All tests are conducted under  $\alpha = 1\%$  significance level. P-values are reported under the coefficient estimates. Also reported is the Adjusted R-squared.