Pre-Market Trading and IPO Pricing

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Abstract

By studying the only mandatory pre-IPO market in the world – Taiwan's Emerging Stock Market (ESM), we document that pre-market prices are very informative about post-market prices and that the informativeness increases with a stock's liquidity. The ESM price-earnings ratio shortly before the initial public offering explains about 90% of the variation in the offer price-earnings ratio. However, the average IPO underpricing level remains high, at 55%, suggesting that agency problems between underwriters and issuers can lead to excessive underpricing even when there is little valuation uncertainty. Also, regulations impact the relative bargaining power of players and therefore IPO pricing.

JEL codes: G14, G15, G18, G24, G32

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The most important issue as well as the biggest challenge in an initial public offering (IPO) is the pricing of the stock. It has been well documented that IPOs tend to be underpriced (relative to aftermarket prices), and that the underpricing phenomenon is persistent over time and across countries.[1] The associated money left on the table, defined as the first-day price increase multiplied by the number of shares issued, is a measure of foregone proceeds and constitutes a substantial opportunity cost of going public for issuing firms. Whether such underpricing is fair compensation for investors to compensate them for risk-bearing or providing information, or is excessive and is driven by agency problems between issuers and underwriters, is the most important debate in the IPO literature (see Ljungqvist, 2007 and Ritter, 2011 for surveys on the topic). Using data from a quasi-natural experiment in Taiwan, we are able to provide evidence that agency problems can result in extreme underpricing.

Underwriters are paid large amounts for pricing and allocating the IPO shares in most countries. How do they arrive at the offer price for an IPO? Under the bookbuilding method used in the U.S. and many other countries, underwriters, with the acquiescence of the issuer, first come up with a suggested price range partly using benchmark pricing, which is based on the firm's accounting numbers and comparable firms' price multiples. The method often leads to wide possible price ranges depending on which firms are picked as the comparables, and may not adequately account for the uniqueness of the issuing firm. Kim and Ritter (1999) and Purnanandam and Swaminathan (2004) show that implied offer prices based on this method are far from being accurate, in terms of predicting the offer price or the after-market price. After setting the file price range, underwriters then collect investors' indications of interest during the bookbuilding process and determine a final offer price.

[1] Jay Ritter's website provides a table with the average level of underpricing in each of 52 countries.

Bookbuilding mechanism design theory argues that value-relevant information is collected during the process and underwriters allocate underpriced shares to induce investors to truthfully reveal information (Benveniste and Spindt, 1989). If information from public sources is available to accurately predict the market price, the amount of underpricing needed to induce investors to reveal their willingness to pay should be minimal. Agency theory argues that self-interested underwriters have strong incentives to bias the offer price down so that they can allocate underpriced shares to their favored clients in exchange for side payments (Loughran and Ritter, 2002; Reuter, 2006; Nimalendran, Ritter and Zhang, 2007; Liu and Ritter, 2010 and 2011; Goldstein, Irvine and Puckett, 2011). This incentive is present irrespective of how difficult it is to predict the market price once an IPO starts trading.

In recent years, a new phenomenon – trading platforms or markets for pre-IPO firms (hereafter pre-IPO markets or simply pre-markets) – has emerged that may potentially provide a solution to the IPO pricing problem, and allows us to test the predictions of the mechanism design and agency frameworks. These pre-markets are in various forms. For example, in the U.S., online sites such as SecondMarket and SharesPost started around 2009, partly due to strong demand for private company stocks such as Facebook. These sites hold auctions for private company stocks from time to time. In the UK, firms can choose to get listed and trade on the Alternative Investment Market (AIM) before an IPO (Derrien and Kecskés, 2007).[2] In Europe, "grey market" trading exists for many IPOs (Aussenegg, Pichler and Stomper, 2006; Cornelli, Goldreich and Ljungqvist, 2006). In Taiwan, since 2005 firms are actually required to be listed on a so-called “emerging stock market” and trade there for at least six months before applying for an IPO.

[2] Although firms can be listed and traded on AIM without an IPO and hence establish a pre-IPO price, AIM is not a pre-IPO market per se as most firms (89% in Derrien and Kecskés’ sample) choose instead to have a conventional IPO.

It is reasonable to think that a pre-market would reduce the uncertainty about a firm's valuation, thus achieving the goal of price discovery and leading to high pricing efficiency during an IPO. Existing studies of European grey markets, the AIM in London, and Indian when-issued trading indicate that pre-market prices are informative about post-market prices (Löffler, Panther and Theissen, 2005; Aussenegg, et al., 2006; Derrien and Kecskés, 2007; Brooks, Mathew, and Yang, 2014). However, given the small amount of evidence, it is not clear whether this conclusion is limited to these specific markets. More importantly, whether these pre-market prices enhance IPO price efficiency is an open question. For example, Aussenegg et al. (2006, p. 860) conclude that "we cannot determine from our data whether when-issued trading enhances the efficiency of IPO pricing" due to the possible interference between the trading and the IPO process (a grey market starts after an IPO price range is determined and coincides with the bookbuilding period). Therefore the benefits of pre-market trading are still unclear.

Meanwhile, there are concerns about such markets, including low liquidity of the market and potential fraud. Questions therefore arise in the U.S. regarding whether pre-markets should be allowed or encouraged, and how they should be regulated. The U.S. Securities and Exchange Commission (SEC) has shown concerns about related issues (see Stone, 2011 and Smith and Eaglesham, 2012), although the Jumpstart Our Business Startups (JOBS) Act of 2012 relaxed a number of regulatory constraints on pre-markets.

We provide evidence on the benefits of pre-market trading from the only mandatory pre-IPO market in the world – Taiwan's Emerging Stock Market (ESM). Since 2005, firms have been required to trade on the ESM for at least six months before they can apply for an IPO. The mandatory feature of the market frees our study from self-selection issues, and the relatively long trading period prior to an IPO enables us to observe how trading evolves as the IPO approaches.

In the first portion of the paper, we examine how useful the pre-market is in terms of price discovery and what factors determine the accuracy of the pre-market price. Consistent with previous studies, we find that as the time gets closer to the IPO, the pre-market price becomes very informative, measured against the after-IPO market price. The ratio of the pre-market price to the offer price explains 77% of the variation in the initial return, i.e., the aftermarket price to the offer price. Controlling for other variables, including the price revision following the bookbuilding period and the lagged market return, does not improve the regression R-squared much, raising it to just 79%.

We hypothesize that the pre-market price should be more informative if the trading is more liquid. We find supporting evidence using three measures of (il)liquidity. A one standard deviation increase in each of the illiquidity measures increases price inaccuracy, defined as the absolute value of the percentage difference between the pre-market and first-day market prices, by 2-3 percentage points, which is 15-20% of the mean of the price inaccuracy.

In the second portion of the analysis, we examine how much the pre-market price is utilized in setting the IPO offer price. Given the informativeness of the pre-market price, asymmetric information-based theories predict that (a) the offer price should largely depend on the pre-market price; and (b) the more accurate the pre-market price is in predicting the aftermarket price, the closer the offer price should be to the pre-market price, i.e., the lower the price discount, defined as one minus the offer price relative to the pre-market price. We find evidence consistent with both predictions. The pre-market price-earnings ratio alone explains more than 90% of the variation in the price-earnings ratio calculated using the offer price. After taking into account the issuer's pre-market price, peer firms' pricing ratios have little explanatory power for the offer price. Moreover, the price discount increases with price inaccuracy and

volatility, and decreases with firm size. The results suggest that underwriters understand both that the pre-market price is useful on average, and that it is even more informative for some IPOs than others.

In the third and final portion of the paper, we investigate the fascinating question of why underpricing remains high despite the pre-market. In our sample, the average offer price is set at 67% of the pre-market price and the average initial return is 55%. Such a high level of underpricing is hard to explain with asymmetric information theories of IPO underpricing. Our evidence suggests that underwriters deliberately underprice shares for their own benefit. We show that the revenue of investment banks from underwriting IPOs increases as underpricing increases. Underwriter brokerage revenues also increase with the money left on the table, consistent with the hypothesis that they allocate underpriced shares to their favored clients in exchange for brokerage business. In addition, the underpricing level increases with the lead underwriter's incentive and bargaining power to underprice.

Our paper contributes to the IPO literature in several ways. Although the paper is not the first to document that pre-market prices are informative, we add to the limited evidence on this topic. Cornelli, Goldreich, and Ljungqvist (2006) and Dorn (2009) also study grey-markets but focus on different research questions. Both use pre-market prices as a proxy for investor sentiment, and find that high pre-market prices are associated with high first-day returns but poor long-run returns. Second, we extend the analysis of pre-market trading by shedding light on what factors make pre-market prices more informative and more useful in IPO pricing. Third, we demonstrate two aspects of how the pre-market price is used in IPO pricing. On the one hand, it largely determines the offer prices, as it should. On the other hand, we document that underpricing levels remain high even when there is little asymmetric information or valuation

uncertainty about the IPO stock. Underwriters have strong monetary incentives to underprice the stock, and the bookbuilding IPO method gives them a lot of power to do so. We provide clean evidence that agency problems can cause high levels of underpricing. We thus offer new insights for the important debate on the causes for underpricing and the choice of the IPO method.

We also document that government policy can affect the level of underpricing. In March 2011, the Taiwanese government instituted a requirement that the offer price cannot be less than 70% of the pre-market price. This requirement has limited the ability of underwriters to underprice IPOs. We document that the average first-day return has dropped from 55% before March 2011 to 27% since then. We conclude that this government policy has reduced IPO underpricing, to the benefit of issuing firms.

1. Institutional Features

1.1 Taiwan's Emerging Stock Market

Taiwan has one of the most active stock markets in the world, with two major stock exchanges: the Taiwan Stock Exchange (TWSE) and the Gre Tai Securities Market (GTSM).[3] The Emerging Stock Market (ESM) was established in January 2002 and is operated by the GTSM, although this market is separate from the GTSM. By providing a trading platform for unlisted stocks, the ESM prepares firms for getting listed by improving information transparency and increasing firm visibility. The pre-IPO trading also results in market prices for the security (price discovery) that can provide information for setting the IPO offer price. Since 2005, it has been mandatory for unlisted firms to trade on the ESM for at least 6 months before they can

[3]At the end of 2010, there were 758 companies listed on the TWSE with a total market capitalization of US$784 billion, ranked number 21 in the world according to the World Federation of Exchanges web site, in spite of a population of only 23 million. The total trading volume of the TWSE in 2010 was US$895 billion, ranked number 14 in the world. In addition, the GTSM listed 564 companies with a total market capitalization of US$66.15 billion and had a total trading volume of US$187.78 billion in 2010.

apply for an IPO and get listed on either the TWSE or GTSM.

To qualify for ESM trading, a firm is required to publicly disclose its financials and important corporate events. In particular, it has to disclose audited annual and semi-annual financial statements. In contrast, a public firm traded on the TWSE or GTSM is required to publish quarterly financial statements. Furthermore, written recommendations are required from two or more securities firms, one of which is designated as the lead advisory/recommending securities firm, which typically will also act as the lead underwriter in its later IPO.[4] In contrast, both the TWSE and GTSM markets have listing requirements on firm age, size, profitability, and the number of shareholders, with the TWSE generally having more rigorous listing requirements than the GTSM.

When registering on the ESM, a firm needs to prepare a prospectus that makes disclosures about the firm's background and history, top management and board of directors, stock ownership, and firm financials. When applying for an IPO later, the firm has to file a new prospectus that makes similar disclosures, and in addition includes underwriters' opinions of the firm and the IPO including the valuation of the stock.

The ESM is a dealers' market. The recommending securities firms act as dealers or market-makers for the recommended stock, and are each required to start with an inventory of at least 100,000 shares, acquired from the firm. Furthermore, dealers as a group are required to start with an initial inventory equal to the maximum of either 1.5 million shares or 3% of shares outstanding.[5] Thus, the public float for ESM trading is at least 3% of shares outstanding. The

[4] A private firm in Taiwan needs to register with the Ministry of Economic Affairs, Department of Commerce and must comply with the Company Act. Firms traded on the ESM are also subject to additional regulations: (1) they have an additional regulator – the Financial Supervisory Commission (FSC), and (2) they are subject to additional laws such as the Securities and Exchange Act.

[5] Most of the stocks have a market price of NT$10-50 (less than US$2), so even a small firm frequently has more than 50 million shares outstanding. Other securities firms can become a dealer for the stock later, with a required initial inventory of at least 30,000 shares. While trading on the ESM, firms can do private placements.

dealers assume the responsibility to continuously offer bid and ask quotes during normal trading hours through the Emerging Stock Computerized Price Negotiation and Click System (the Click System). The quoted spread cannot exceed five percent of the ask price. The recommending securities firms are obligated to trade at the quoted prices for orders of 2,000 shares or less. Investors can submit orders to the Click System through their brokers. For orders of 10,000 shares and more, the investor can directly negotiate with a dealer via other methods, such as by telephone. All trades are recorded in the Click System. In contrast, both TWSE and GTSM operate through fully automated electronic trading systems where only limit orders are accepted and orders are executed in strict price and time priorities. Shorting is prohibited on the ESM.

Both individual and institutional investors can trade on the ESM, although mutual funds were prohibited from participating during our sample period. However, based on interviews with staff members of the ESM and practitioners in various institutions, we learned that insurance companies, pension funds, and foreign institutional investors tend to refrain from investing in ESM stocks since they are viewed as highly risky securities. Thus, ESM trading is typically dominated by retail investors. Once the company applies for an IPO, the following group of insiders is restricted from selling: directors, supervisors, and shareholders who hold at least 10% of the firm.[6]

Compared to the other pre-markets in the world, Taiwan's ESM has two distinctive features: (1) it is mandatory for pre-IPO firms, and hence there is no concern about selection bias; and (2) the pre-IPO market for each stock lasts for a relatively long period (by regulation, at least

[6]According to Article 216 of the Company Act of Taiwan, a firm subject to public disclosure requirements should have at least two supervisors, who are elected at shareholder meetings. A supervisor shall not concurrently be a director, manager, or employee of the company. Supervisors in Taiwan are responsible for monitoring directors and management. Supervisors function similarly to the audit committee of firms in the United States, fulfilling their duties by providing an independent and objective review of the financial reporting process, internal controls, and the audit function.

6 months). These features enable us analyze the dynamic development of pre-IPO trading and identify the factors that affect the usefulness of such trading and the related pre-IPO prices.

1.2 The IPO process in Taiwan

Taiwan had experimented with various IPO methods in the past including fixed-price offering (FPO hereafter), auction, bookbuilding, hybrid auction (auction plus FPO), and hybrid bookbuilding (bookbuilding plus FPO). Since 2005, the hybrid bookbuilding method has become the dominant method. In our sample of 218 IPOs, most IPOs use hybrid bookbuilding, with 14 firms using pure bookbuilding. During our sample period of October 25, 2005 through March 1, 2011, only two IPOs use non-bookbuilding methods (one uses a hybrid auction and the other uses a fixed-price offering). Both are excluded from the sample.

As a normal practice worldwide, the bookbuilding tranche is open to institutional and large individual investors. The FPO tranche, on the other hand, is open to the general public. Bookbuilding investors give indications of interest (nonbinding bids with price-quantity combinations). Allocation to bookbuilding investors is at the discretion of underwriters. In the FPO, each investor can only submit an order of one lot composed of one thousand shares, and allocation is determined by a lottery if there is oversubscription. FPO investors do not submit price suggestions, with the understanding that they will receive the same offer price as bookbuilding investors. Institutional investors are prohibited from participating in the FPO.[7] Except for the overallotment, only primary shares are sold in the IPOs during our sample period. That is, all of the shares offered are from the issuing firm rather than selling shareholders.

[7]As argued in Chiang, Qian and Sherman (2010), although a hybrid IPO consists of two stages, they are essentially independent sales from the investors' point of view. They state, "Due to the one-lot size constraint and frequent oversubscription in the fixed-price tranche, any investor who wishes to make a large investment will not rely on the second-stage sale. More important, there is little room for strategic interaction between the two stages." (p1210). Their comments are for hybrid auctions during 1995-2000, during which the fixed-price offer is run after the auction tranche, hence referred as "second-stage sale". The same argument, however, applies to the hybrid bookbuilding method in our sample.

Typically 70-90% of total shares offered in the IPO are sold through the bookbuilding tranche.

For 84% of the hybrid bookbuilding IPOs in our sample, the bookbuilding and FPO tranches run simultaneously, with the rest having the bookbuilding tranche followed by the FPO tranche. The bookbuilding period typically lasts for four business days during which investors submit nonbinding orders. The FPO process often starts one day later than the start of bookbuilding, but ends at the same time. An announcement is made on the first day of bookbuilding that, among other things, gives a suggested price range. On the business day after bookbuilding ends, the offer price is determined before noon (we call this day the pricing day and the last bookbuilding day the pre-pricing day). As is normal with the bookbuilding method, the final offer price is a result of negotiation between the underwriter and the issuer, and typically the underwriter has a lot of power in determining the price. In the next few days, shares are allocated and proceeds are collected. In most cases, the stock starts trading on the TWSE or GTSM on the fifth business day after the pricing day. ESM trading continues after the pricing, ending the day before TWSE or GTSM trading commences. A figure in Internet Appendix A shows the time line of the IPO process (http://site.warrington.ufl.edu/ritter/ritterwp.htm).

2. The Sample and Data

Our sample includes 218 firms that went public between October 25, 2005 and March 1, 2011.[8] All sample firms are subject to a regulation effective in January 2005 that firms must be traded on the Emerging Stock Market for at least 6 months before they apply for an IPO. Three types of firms are exempt from this requirement: firms spun off from listed parents, privatization

[8] Our sample starts with the first IPO that is subject to the mandatory ESM trading. The IPOs after our sample period are subject to a new regulation that the offer price may not be less than 70 percent of the average ESM trading price during the 10 business days before the bookbuilding agreement has been registered with the Taiwan Securities Association (TSA). The new rule also says that if there is a difference of 50 percent between the offer price and the closing price on the pre-price day, a concrete explanation needs to be provided.

of public enterprises, and foreign companies. Although some of these exempted firms chose to trade on the ESM before an IPO, we exclude all of them from our sample.[9]

We obtain daily trading data for ESM stocks including price, return, trading volume, and shares outstanding from Taiwan Economic Journal (TEJ). TEJ also provides daily trading data for listed firms after the IPO. Firm information such as firm age, assets, whether it is backed by venture capital, and accounting information is collected from the ESM or IPO prospectus. IPO characteristics such as fees, offer price, and the number of shares issued in each tranche are collected from three sources: the IPO prospectus, the bookbuilding and FPO announcement, and the underwriting announcement that is made after the bookbuilding and FPO processes are completed.

Table 1 presents the summary statistics of firm characteristics at two points of time: when firms start to trade on the ESM (Panel A) and when they apply for an IPO (Panel B). When trading starts, the median firm is 9 years old, with an average asset value of NT$2.1 billion (about US$70 million), and an average annual revenue of NT$1.6 billion (about US$53 million).[10] The average debt ratio (total liabilities relative to assets) is 41.3%. The average return on assets (ROA) is 9.2%. Forty-five percent of firms are backed by venture capital.

At the time of the IPO application, Panel B reports that on average firms are 1.7 years older, with increased assets, revenues, and ROA, and a decreased debt ratio relative to when ESM trading started. Panel C compares the differences in means and medians of these variables

[9]During our sample period, there are 8 IPOs that are spin-off firms and 32 that are foreign companies (including those that issue Taiwan Depository Receipts). Two IPOs are privatizations of public enterprises. One of them uses the hybrid auction IPO method and the other uses pure fixed-price offering. There is also one firm that went IPO during our sample period (in November 2005) but its IPO application was before 2005 and hence was not subject to the new regulation. These firms are excluded from our sample.

[10] All NT$ values in the paper are deflated to constant year 2011 NT$ based on Taiwan's CPI index. At the end of 2011, the exchange rate was US$1 =NT$30.29.

between the two time points, with all differences being significant at the 1% level.[11] In addition, the fraction of firms that are backed by venture capital has increased from 45% at the time of ESM listing to 56% at the time of the IPO application.

Table 2 shows the IPO characteristics. In the average IPO, the number of shares issued is 10.4% of the shares outstanding before the IPO. The average proceeds raised is NT$495.3 million (US$16 million). Both of these numbers are considerably lower than the corresponding numbers for U.S. IPOs, where the average IPO during 2005-2011 issued close to 50% of the pre-IPO shares outstanding and raised more than 15 times as much money, according to numbers listed on Jay Ritter's website. Thirty percent of the firms are listed on the TWSE, and 70% are listed on the GTSM. The median P/E ratio (i.e., offer price relative to the annual earnings per share before the IPO) is 11.7. After excluding three outliers, the average P/E ratio is 18.4.[12] Price revision, computed as the offer price relative to the midpoint of the price range announced shortly before the bookbuilding process, minus 1, has a mean of 0.13%, a median of 0, and a standard deviation of 4.6%. None of the issues in our sample is priced outside of its price range.

We calculate the price discount as one minus the ratio of the offer price over the ESM closing price on the day before IPO pricing, multiplied by 100%. The average price discount is 33.0%. Alternatively, the ratio of the ESM closing price on the day before IPO pricing over the offer price minus one, multiplied by 100% (which we call expected initial return), has an average of 58.4%. In comparison, the initial return of IPO investors (i.e., the closing price on the first-trading day on TWSE/GTSM relative to the offer price minus one) has an average of 55.3%. All

[11] We use paired t-tests for differences in means and Wilcoxon signed rank tests for differences in medians, assuming independence across IPOs. We do not test the significance of the change in firm age since the value of this variable increases by construction.

[12] When applying for an IPO, firms in general are required to have positive earnings. However, a firm can be exempted from the requirement if it is deemed as advancing important innovations or participates in major national public construction projects. In our sample, two firms have negative earnings when applying for an IPO. Another firm has a tiny EPS and hence a P/E ratio larger than 1000. We exclude these three firms when the P/E ratio is used in our analysis.

218 IPOs have an offer price less than the ESM closing price. Only 6.4% of IPOs drop in price on the first day of trading, and even then by no more than 10%.

With an average discount of 33% and an issue size of 10% of the pre-IPO shares outstanding, the money left on the table is approximately 3% of firm value, which is smaller than that in the United States, where the comparable numbers for 2005-11 are 10% (for the discount) and 50% (for the issue size), resulting in foregone proceeds of 5% of pre-IPO firm value. Furthermore, the investment banking fees in the U.S. are larger than in Taiwan (which will be discussed later), accentuating the difference in foregone proceeds.

We note that not all ESM firms have IPOs. There are 299 firms that have traded on the ESM during our sample period but haven't had an IPO by January 2014. Among them, 166 firms stopped trading on the ESM, mostly due to poor performance but sometimes because of mergers and acquisitions. We compare the 299 no-IPO firms with our sample firms in Table IA-1 of Internet Appendix A. These no-IPO firms tend to be less profitable than our sample firms, and they suffer lower liquidity and lower returns during the first 6 months of ESM trading. It appears that more successful firms tend to have IPOs. Our study focuses on the informativeness of ESM prices for those that do go public. Our conclusion that their pre-market prices right before an IPO are informative cannot be extended to all ESM prices. It is possible that some firms cannot establish a liquid market and informative prices on the ESM, which in turn prevents them from having IPOs.

3. The Informativeness of ESM Prices

We focus on the ESM price shortly before the IPO. In Internet Appendix A, however, we report how trading and prices evolve for ESM stocks. Specifically, we examine liquidity, returns,

and volatility for three event periods: the six months after ESM trading starts, the six months prior to IPO application, and the three months prior to IPO pricing. For comparison, we also investigate the six-month period of trading on the TWSE or GTSM after the IPO. The general trend is that when a firm moves towards its IPO, its stock trading on the ESM becomes more liquid and less volatile; and it tends to have a large price run-up prior to the IPO. It is likely that these patterns are due to both the sample selection bias associated with successful IPOs, and greater liquidity in anticipation of the greater post-IPO liquidity to come.

3.1 Price accuracy on ESM

We examine the informativeness of the pre-market price in reflecting the fundamental value of a stock. To do that, we assume the after-IPO market price is efficient and use it as the benchmark. Specifically, we define the price error for stock *i* on day *t* as:

$$\text{Price Error}_{i,t} = \frac{P_{i,t} - P_{i,FTD}}{P_{i,FTD}},$$

where $P_{i,t}$ is the closing price on day t (t belongs to the pre-IPO period), and $P_{i,FTD}$ is the closing price on the first trading day on the TWSE or GTSM. We define the absolute value of the price error as price inaccuracy, i.e.,

$$\text{Price Inaccuracy}_{i,t} = \left| \frac{P_{i,t} - P_{i,FTD}}{P_{i,FTD}} \right|.$$

We observe a clear decreasing trend for price inaccuracy as time approaches the IPO. Table 3 reports the summary statistics of these variables 6, 3, 2, and 1 month(s) before, 1 day before, and the 4th day after IPO pricing.[13] At six months before the pricing (and after IPO application), the mean (median) price inaccuracy is 50.8% (35.1%). On the day before the

[13] In Internet Appendix A, we also display a figure for the daily mean and median price inaccuracy for the period around IPO pricing, i.e., from six months before pricing or the IPO application date, whichever is later, to four business days after IPO pricing.

pricing date, the mean (median) price inaccuracy is 14.8% (13.0%). This decrease is not surprising—the price of a random stock today will be a less accurate predictor of the price six months from now than will be the price the day before the six-month anniversary. The standard deviation also steadily decreases from 50.4% to 11.4%. It is clear that the pre-market price shortly before the IPO is close to and hence very informative about the aftermarket price.

Several reasons may contribute to the disparity between the ESM price on the pre-pricing day and the after-market price. First, there might be information resolution over the 5-day period. This applies to listed firms on the TWSE and GTSM as well, except that our sample firms have an important type of information resolution in common--the culmination of the IPO. Second, the trading environment changes. Now officially listed on the TWSE or GTSM, these stocks may gain more attention and attract more investors; their trading becomes more liquid, and hence prices more efficient. Third, there might be investor clientele changes. As discussed before, institutional investors are either restricted or self-restricted from participating in the ESM market. Hence it is likely that more institutional investors invest in or trade the stock once it is listed on the TWSE or GTSM.

Table 3 also reports summary statistics for the price error. It shows that mean and median price errors are mostly not significantly different from zero 6, 3, 2 and 1 month(s) before IPO pricing. However, on the day before pricing, the average pricing error is 6.0% and the median is 6.5%; both are statistically significant. This positive pricing error is consistent with the finding of Cornelli, Goldreich and Ljungqvist (2006) for European grey markets.

To further test the informativeness of the pre-market price, we explore the predictability of the initial return based on the pre-market price. Specifically, we use the expected initial return based on the pre-market price (i.e., pre-market price over the offer price, minus one) to predict

the post-market first-day return. (The regression results are available in Internet Appendix A.) When estimating a univariate regression of the actual return on the expected initial return, we find a regression coefficient of 1.23, which is significantly different from 0, but not significantly different from 1.00. The expected initial return alone explains 77% of the variation of the actual initial returns. In contrast, multivariate regressions predicting initial returns using U.S. data (without the pre-market) typically have R-squared's around 20% (e.g., see Hanley, 1993; Lowry and Schwert, 2004; Liu and Ritter, 2011).

We then include a set of control variables that might affect actual initial returns: the lagged 3-week market return, (asymmetric) price revision, log(assets), return on assets, a VC dummy that equals one if the firm is backed by venture capital, and firm stock return volatility during the 3 months prior to the pricing, as well as year and industry dummies. The coefficient on the expected initial return is similar to that in the univariate regression. The R-squared is 79% for the multivariate regression, which is not much of an improvement from the univariate regression value of 77% that uses expected initial return as the only explanatory variable.

3.2 Price accuracy and stock liquidity on ESM

We hypothesize that the informativeness of pre-market prices should be positively related to the liquidity of the stock. We use three measures of illiquidity: the percentage of zero trading days (Rabinovitch, Silva and Susmel, 2003), the percentage of zero return days (Bekaert, Harvey and Lundblad, 2007; Chen, Lesmond and Wei, 2007), and the Amihud ratio (Amihud, 2002).[14] The larger each of these measures, the less liquid the stock is. We measure the illiquidity variables during the three months prior to the pricing day.

[14] The Amihud ratio for firm *i* is defined as $A_i = \frac{1}{T}\sum_{t=1}^{T}\frac{|r_{i,t}|}{dvol_{i,t}}$, where $r_{i,t}$ is the daily stock return (in percentage points) and $dvol_{i,t}$ is daily dollar volume (in millions of NT$). It measures the price impact (i.e., the absolute value of the return) per unit of dollar volume. If the dollar trading volume was calculated using U.S. dollars, the Amihud ratio would be approximately 30 times larger.

Table 4 reports the results of both univariate and multiple regressions of pre-pricing day price inaccuracy on illiquidity, with and without control variables. Consistent with our hypothesis, price inaccuracy increases with all measures of illiquidity (i.e., price accuracy increases with liquidity). In terms of economic significance, a one-standard-deviation increase in *% of zero-trading days* (16.76%) increases price inaccuracy by 2.48 percentage points (using the multiple-regression regression result); a one-standard-deviation increase in *% of zero-return days* (21.10%) increases price inaccuracy by 2.58 percentage points; and a one-standard-deviation increase in the *Amihud ratio* (10.66%) increases price inaccuracy by 2.46 percentage points. In comparison, the mean price inaccuracy is 14.78%. The coefficients on the control variables are not significant, although their signs are consistent with the notion that larger firms, less profitable firms, and less volatile firms tend to have higher price accuracy (i.e., lower price inaccuracy).

4. IPO Offer Price and Pre-Market Price

Table 3 showed that as the IPO nears, the pre-market price gets very informative about the fundamental value of the stock, measured by the after-market price. The pre-market price therefore should be useful in setting the IPO offer price. More specifically, the bookbuilding theories based on asymmetric information posit that underpricing is used to compensate regular investors for providing information that is not readily available from public sources (e.g., Benveniste and Spindt (1989) (with endowed information), and Sherman (2000) and Sherman and Titman (2002) (with costly information)). This framework generates predictions that the IPO offer price should exhibit the following features: (1) the offer price should largely depend on the pre-market price but not peers' pricing; (2) the more informative the pre-market price is, the closer and higher the offer price will be relative to the pre-market price; and (3) there should be

little underpricing. We test the first two predictions in this section and explore the third in the next section.

To test the first prediction, we run a horse-race between the stock's own pre-market price and its peer companies' prices in determining the IPO offer price. Specifically, we regress the (standardized) offer price on the stock's own pre-market price and its peer firms' market price. We are interested to see which variable explains more of the variation in the offer price. We standardize prices using two variables – earnings per share (EPS) and book value of equity per share, i.e., we use two price ratios: the P/E ratio and the M/B (market-to-book) ratio. For brevity, we present results using the P/E ratio and note that results are similar when the M/B ratio is used. For each sample firm, peer companies are identified in two alternative ways: (1) we include all firms in the same industry that are listed on either the TWSE or GTSM, and use the median price ratio; (2) we identify a matching firm in the same industry that is traded on the TWSE or GTSM and has the closest asset value as the IPO firm. Industries are defined using the TWSE 2-digit industry classification; our sample includes 12 of the 31 possible industries.

Panel A of Table 5 reports the summary statistics of P/E ratios. The regression results in Column 1 of Panel B show that the ESM P/E ratio explains 91.4% of the variation in offer price P/E ratios. In Column 2, the only explanatory variable is the industry median P/E. The regression coefficient is also positive and significant, but the R-squared is only 1.9%. When we include both variables in the regression in Column 3, both the value and the t-statistic of the coefficient on the pre-market P/E remain similar to those in Column 1, but the coefficient on the industry median P/E becomes significantly negative. In addition, the R-squared is close to that in Column 1 (91.7% vs. 91.4%), suggesting that adding the industry median P/E in the regression does little to improve the fit of the model. Interestingly, given the high R^2, the slope coefficient for the pre-

market P/E is approximately 0.6, rather than the 1.0 that might be expected. This, together with the small intercept (1.2), suggests that although the offer price largely depends on the pre-market price, it is a sizable discount off the pre-market price. In other words, the offer price is on average set at approximately 60% of the pre-market price, consistent with the average price discount of 33.0% that we reported in Table 2.

Column 4 uses the matching firm's P/E ratio as the only explanatory variable and Column 5 includes both the matching firm's and the issuing firm's pre-market P/E ratios. In both regressions, the coefficient on the matching firm's P/E is indistinguishable from zero.

The results in Table 5 support the notion that the pre-market price is highly relevant in setting the IPO price. The information contained in the pre-market price is not captured by peer firms' price information, reflecting the effects of noise and outliers.

We now examine what determines the cross-sectional difference in the offer price relative to the pre-market price, i.e., the price discount. Asymmetric information-based theories of IPO underpricing hypothesize that the less risky the stock is and the more informative the pre-market price is, the less is the discount that is needed when setting the IPO offer price

Table 6 reports the results of a regression of the *price discount* on stock and firm characteristics. Columns 1-5 present univariate regressions of the price discount on, respectively, pre-market *price inaccuracy*, pre-market stock *volatility*, a *VC dummy*, *ROA*, and *log(assets)*, and Column 6 presents a multiple regression including all of the variables as well as year and industry dummies. Consistent with the asymmetric information hypothesis, the coefficients on *price inaccuracy* and *volatility* are both significantly positive, and the coefficient on log(assets) is significantly negative. The coefficients on VC dummy and ROA are negative, as predicted by the hypothesis as well, although neither is statistically significant. In terms of economic

significance, a one-standard-deviation increase in *price inaccuracy* (11.4%) increases the *price discount* by 2.0 percentage points; a one-standard-deviation increase in *volatility* (1.5%) increases the *price discount* by 3.6 percentage points; and a one-standard-deviation increase in *ln(assets)* (0.9) decreases the *price discount* by 3.4 percentage points.

One concern associated with using *price inaccuracy* in the previous regression is that it is not known at the time of IPO pricing. Alternatively, we use the predicted value of price inaccuracy from Table 4 after excluding liquidity variables from the logit regression. We call it *expected price inaccuracy*. The regression of price discount on expected price inaccuracy is reported in Column 7 of Table 6. We find that the price discount increases with *expected price inaccuracy*, which supports the notion that the price discount decreases with the informativeness of the pre-market price.

5. IPO Underpricing and Underwriter Incentives

The evidence in the previous section suggests that underwriters do recognize the usefulness of the scaled pre-market price and largely rely on the information in setting the IPO offer price, in that it explains over 90% of the variation of the offer price, whereas the scaled multiple of peer firms explains little of the variation. Given that the existence of the pre-market price reduces valuation uncertainty of the stock and also the information asymmetry between different clienteles of investors, the information-based theory predicts that little underpricing is needed to compensate investors for providing private information.

In contrast to this prediction, we observe a substantial amount of underpricing in our sample: the average *price discount* is 33.0% and the average *expected initial return* is 58.4%. Similarly, the actual *initial return* of IPO investors averages 55.3%. Such a high level of

underpricing is difficult to justify by information/risk reasons given the informativeness of the pre-market prices. Neither can it be explained by the lack of understanding of the information because the offer price does depend on the pre-market price to a large degree.

The evidence therefore points to the possibility that agency problems play an important role in setting the IPO price. Loughran and Ritter (2002) and Liu and Ritter (2011), among others, argue that underwriters have incentives to underprice IPO shares more than necessary and allocate these underpriced securities to their favored clients in exchange for side payments. In the U.S., such side payments include future investment banking business when shares are allocated to corporate executives (Liu and Ritter, 2010) and brokerage trading commissions (soft dollars) when shares are allocated to individuals or institutions (Reuter, 2006; Nimalendran, Ritter and Zhang, 2007; Goldstein, Irvine and Puckett, 2011). Similar to the U.S., a small group of investment banks dominate the underwriting market in Taiwan, which gives underwriters the bargaining power to underprice for their own benefit.[15]

In our setting, we explore the agency hypothesis with three tests: first, we examine whether underwriting-related income increases with underpricing. If yes, the underwriters will have direct monetary incentives to underprice IPO shares. Second, if these Taiwanese underwriters also trade underpriced shares for brokerage business, we expect that their brokerage revenues will increase with the money left on the table of the IPOs they underwrite. Third, we explore the cross-sectional differences in underwriters' incentives and power to underprice. The agency hypothesis predicts more underpricing, the higher are the incentives or bargaining power.

5.1 Underwriting income and IPO underpricing

In Taiwan, underwriters earn a sizable fraction of their fees from IPO investors in

[15] Nineteen unique banks acted as lead underwriters during our sample period. Among them, six banks command 60% of the market share in terms of the number of IPOs and 78% of the market in terms of proceeds raised.

addition to a fixed fee (typically NT$5 million) they charge to the issuer (see Chen, Fok, and Wang, 2006). The fee structure is such that underwriters can earn more when investors are more enthusiastic about the security.[16] This feature provides a unique opportunity to directly test whether underwriter fee income increases with the underpricing level.

Underwriters receive variable investor fees across IPO issues. Fees are from both bookbuilding and FPO investors. Each FPO subscriber pays a fixed fee of NT$20, of which NT$8.5 goes to underwriters (the rest is paid to brokers and the TWSE for handling the orders). FPO fees are paid regardless of the allocation. Hence the higher the subscription ratio, the more fees the underwriters earn. We calculate the percentage FPO fee as 8.5 times the FPO subscription ratio, divided by the offer price, multiplied by 100%/1,000, since each investor requests one lot of 1,000 shares. Since the subscription ratio has a large variation (a mean of 90 times and a standard deviation of 169), the FPO fee also varies considerably (with a mean of 2.0% and a standard deviation of 1.9% of the proceeds).

For the bookbuilding tranche, underwriters have discretion on how much fee to charge on a per share basis.[17] The bookbuilding fee paid by investors as a percentage of the proceeds varies from 0 to 8.7%, with a mean of 1.7%. We calculate the total investor fee as the weighted average of the FPO fees and the bookbuilding fee, where the weighting variable is the proceeds raised in the two tranches.[18] Table 7 Panel A reports the summary statistics of these fees.

For the underpricing level, we use an ex ante price discount measure based on the price

[16] Chowdhry and Sherman (1996) argue that if the issuer (or the underwriter) collects interest float on investors' advance payment, then there is an additional incentive to underprice the offering. This source of revenue does not apply to our sample since investors only pay at the end of the bookbuilding or FPO submission period.

[17] Since bookbuilding fees are discretionary, underwriters have two choice variables, fees and the price discount, in maximizing their revenues. But since investors' incentives are such that they are willing to pay higher fees in return for a higher price discount, the two choice variables can be collapsed to one, i.e., the price discount.

[18] For the 14 pure bookbuilding IPOs in our sample, the total investor fee equals the bookbuilding fee. Because of these 14 IPOs, the average total investor fee is not a number between the average FPO fee and the average bookbuilding fee (see Table 7 Panel A).

range specified in the bookbuilding announcement, instead of an ex post measure based on the offer price. This is because investor demand and fees are fixed before the offer price is finally set, so they must depend on the expected price discount level. Specifically, we define *intended price discount* as the midpoint of the price range relative to the closing pre-market price on the day before the bookbuilding starts. The *intended price discount* turns out to be close to the actual *price discount* (the mean is 32.0% vs. 33.0%, the median is 30.5% vs. 31.4%, and the correlation is 0.89). Recall that the variable *price revision* has a standard deviation of only 4.6%.

Table 7 Panel B reports the results of regressions of underwriter fee income, as a percentage of the proceeds, on the percentage *intended price discount*, with and without controlling for other firm and stock characteristics. For both the univariate and multivariate regressions, the coefficient on the *intended price discount* is positive and significant at the 1% level. Based on the multivariate regression, a one-standard-deviation increase in the *intended price discount* increases the total investor fee by 0.38% (=0.026×14.8), which is economically significant given an average total investor fee of 1.67%. Given the average proceeds of NT$495.3 million, a total investor fee of 0.38% translates into NT$1.9 million. In comparison, the fixed fee the issuer pays to the underwriter is typically NT$5 million.

The results in Table 7 show that fee revenue increases with the intended price discount (i.e., the expected underpricing level). Hence underwriters have direct monetary incentives to underprice IPO shares to increase their own income from fees.

5.2 Underwriters' brokerage revenues and money left on the table from IPOs

Existing studies report that U.S. underwriters have significant incentives to allocate underpriced shares to institutional investors who give them brokerage business. We explore this possibility in our sample by examining the relationship between an underwriter's brokerage revenues and the money left on the table from IPOs that they underwrite. A positive relationship

is consistent with the notion that underwriters trade underpriced shares for brokerage business.

We hand-collect lead underwriters' brokerage revenues from their annual reports. There are 19 unique lead underwriters in our sample. For each IPO, we compute the expected money left on the table as the shares issued times the difference between the pre-market price on the day before IPO pricing and the offer price. For each underwriter-year, we sum up the total money left on the table from the IPOs that the firm lead underwrites.

We regress the underwriters' brokerage revenues (in the current and next year) on the total money left on the table. The agency hypothesis predicts that the more money that is left on the table, the more investors will overpay on commissions on other trades, as a *quid pro quo* in order to receive preferential allocations of shares, increasing the underwriter's overall brokerage revenues. Because each underwriter has a different normal level of revenues (some are bigger than others), in our empirical work we control for underwriter fixed effects. By doing so, we capture the within-firm changes in brokerage revenues due to changes in money left on the table. We also control for the market return during the year, as market returns may affect both money left on the table in IPOs and banks' brokerage revenues.[19]

Table 8 reports the regression results. The dependent variable is the log of the current year's brokerage revenues (in millions) in Column 1 and next year's brokerage revenues in Column 2. The main variable of interest is the log of the total money left on the table during the year (in millions). Both Columns 1 and 2 show a significantly positive coefficient on the variable, suggesting that more money left on the table from IPOs is associated with an increase in an underwriter's brokerage revenues. Specifically, the Column 1 coefficient of 0.054 suggests that for each 10% increase in the money left on the table from the IPOs it underwrites, the

[19] Controlling for other market condition measures such as aggregate trading volume or the turnover ratio of the stock market, and GDP growth yield similar results.

underwriter's brokerage revenues increase by 0.54%.

In unreported results, we find that after controlling for underwriter fixed effects, *money left on the table* has an insignificantly negative relation with an underwriter's brokerage revenues in the previous year. This pattern indicates that the positive relations between IPO underpricing and the current and next year's brokerage revenues are unlikely due to spurious correlations.

In summary, the results in Table 8 show that underwriters' brokerage revenues increase if they leave more money on the table for IPO investors. This is consistent with the hypothesis that they allocate underpriced shares in return for brokerage business.

The above two subsections show that underwriters income increases with IPO underpricing, both directly through fees from IPO investors, and indirectly through increased brokerage business. Our analysis may still underestimate the compensation underwriters receive from allocating IPO shares. For example, we suspect they will have similar incentives as their U.S. counterparties to trade IPO shares for future investment-banking businesses, although we do not have data and evidence on this. This direct and indirect compensation for allocating underpriced shares is consistent with our agency explanation for why the underpricing level remains high even though underwriters recognize that the pre-market price is informative and they set the offer price largely according to it. Although Taiwan has a different fee structure than the U.S. market, underwriters in both markets have strong monetary incentives to underprice IPO shares. Our setting allows us to show clean evidence of agency problems when there are few asymmetric information problems.

The sensitivity of underwriter revenue to underpricing does not, however, explain why issuers do not agree to pay higher fees in return for less underpricing, with a net effect of higher net proceeds. For the U.S., Liu and Ritter (2011) posit that underwriters with influential analysts

have bargaining power, and are able to maintain excessive underpricing in equilibrium. Neither they nor we explain why underwriters with bargaining power extract rents via excessive underpricing, rather than through charging higher gross spreads.

5.3 Underwriters' impact on underpricing

Cross-sectionally, the agency hypothesis predicts higher underpricing when the underwriter has higher incentives or higher bargaining power to do so. We design three tests to explore the cross-sectional differences in underwriters' incentives or bargaining power. First, we measure a lead underwriter's monetary incentive to underprice based on the percentage of shares sold/allocated by the lead. The lead underwriter has all the pricing power whereas the other syndicate members help sell the shares. Whereas the lead receives most of the fixed fees from the issuer, the investor fees an underwriter receives depend on the number of shares it sells, for both the bookbuilding and FPO tranches. As discussed in Section 5.1, the investor fees increase with the underpricing level. Therefore the higher the percentage of shares sold by the lead, the higher are the incentives for it to underprice the stock.

Second, more generally, if underwriters' intrinsic incentives and bargaining power do influence the underpricing level, we expect to see a persistent underwriter effect on underpricing (Hoberg, 2007). In other words, we expect an IPO's *price discount* to be positively related to the price discounts on previous IPOs lead underwritten by the same bank. Specifically, we regress an IPO's price discount on the average price discount of the lead's IPOs in the previous three years.

Third, we conjecture that if an issuer has more cash needs and is more likely to come back to the financial market in the near future, then the underwriter may have more bargaining power to induce the issuer to leave more money on the table, due to the importance of analyst coverage that is bundled with underwriting. We use the ex post occurrence of a firm's security issuance after the IPO as a proxy for its ex ante likelihood.

Table 9 reports the results of the three tests. Panel A presents the univariate subsample t-tests, and Panel B presents the regression results. In Panel A, we divide the sample into subsamples based on three variables respectively, to capture the three ideas described above. The variables are: *lead percentage*—the percentage of shares sold by the lead, *previous price discount*—the average price discount in the previous three years, and *issue again*—a dummy variable equal to one if the firm issues any public securities (seasoned equity offerings or corporate bonds) again in the next two years. Alternatively, we define *issue again* equal to one if the firm issues seasoned equity offerings in the next two years, with similar results. We categorize an IPO observation as having high underwriter incentive/power to underprice if it has (Column 1) above-median *lead percentage*, or (Column 2) above-median *previous price discount,* or (Column 3) its value of *issue again* is equal to one. The other IPOs are categorized into low incentive/power subsamples. The agency hypothesis predicts that IPOs with high underwriter incentive/power should exhibit higher underpricing.

Panel A reports the mean price discount for each subsample. Consistent with the agency hypothesis, each high incentive/power subsample exhibits a higher average price discount than its low incentive/power counterparty. The average price discount is 35.1% vs. 30.9% when IPOs are categorized by above- vs. below-median *lead percentage*, 35.4% vs. 31.3% when IPOs are categorized by above- vs. below-median *previous price discount*, and 36.4% vs. 30.9% when IPOs are categorized by further security issuance. All differences are significant at the 5% level.

We then estimate multivariate regressions. The dependent variable is the percentage *price discount*. The variables of interest are the three variables that measure the lead underwriter's incentive to underprice. We control for firm characteristics and industry and year fixed effects. Panel B reports the regression results. Consistent with the results in Panel A, each of the three

main variables—*lead percentage, previous price discount,* and *issuer again* has a significant and positive coefficient. That is, the higher the lead underwriter's incentive and power to underprice, the higher the underpricing level.

Another measure that has been used in the literature for underwriter power is a bank's market share in the IPO market. Because market share is also a measure for underwriter reputation, its impact on underpricing is conceptually unclear. On the one hand, rent-seeking underwriters with higher bargaining power will want to increase underpricing; on the other hand, underwriters who care about their reputation capital will want to lower underpricing (e.g., Beatty and Ritter, 1986). In addition, prestigious underwriters provide higher certification value and hence investors may demand lower underpricing (e.g., Carter and Manaster, 1990). The empirical evidence for the relationship between underwriter market share and underpricing in the U.S. varies with the sample period (e.g., Beatty and Welch, 1996).

In our sample, we find an underwriter's market share has no significant impact on the price discount (not tabulated). This lack of a pattern is consistent with the opposing effects of underwriter reputation and power as described above. Another possible reason for the lack of a pattern is the endogenous matching between the underwriter and the issuer (Fernando, Gatchev and Spindt, 2005). Although underwriters with a higher market share tend to have greater bargaining power, all else equal, the issuers they serve may also be of higher quality and thus also have more bargaining power. Consistent with this conjecture, we find a positive correlation between issuer size and underwriter market share. The net bargaining outcome between the issuer and the underwriter therefore cannot be directionally predicted.

5.4 Impact of a regulatory constraint

Acting upon complaints of excessive underpricing, the Taiwan Securities Association (TSA), under the guidance of the Financial Supervisory Commission (FSC), imposed a new rule

in 2011 mandating that the IPO offer price must not be lower than 70% of the average ESM trading price during the 10 days before the bookbuilding announcement is submitted to the TSA (which typically is two business days before the bookbuilding starts). The rule applies to IPOs after our sample period.

We examine how this rule affects ESM trading and the IPO offer price. For this purpose, we impose the same sample criteria as before and collect data for 172 bookbuilt IPOs during March 2011 – December 2014. Panel A of Table 10 compares the firm characteristics of IPO firms during the two sample periods. Overall similar firms issue IPOs under the two regimes.[20]

We repeat all the analysis for the post-sample period and in most cases find qualitatively similar results (available in Internet Appendix B): (a) pre-market prices are informative with a mean price inaccuracy of 12.7% on the day before IPO pricing; (b) the higher is the liquidity of the ESM stock trading, the more informative is the pre-market price; (c) the scaled pre-market price alone explains more than 90% of the variation in offer price.

The striking difference for the new period, however, is that the average underpricing level is roughly halved! The average initial return decreases to 27% (vs. 55% in our sample period). Using the same definition of price discount as before (i.e., benchmarked against the ESM closing price before IPO pricing), the average price discount is 23% (vs. 33% in our sample period). Panel B of Table 10 compares the initial return and price discount in the two regimes. The difference in both means and median of these two variables are statistically significant.

If we calculate the price discount against the regulatory benchmark, i.e., the average ESM trading price during the 10 days before the bookbuilding announcement is submitted to the TSA, the average price discount is also 23%, with the 25th, 50th, and 75th percentiles equal to 19%,

[20] The average ROA decreases in the later period. Part of the reason is that in 2010, regulators issued new rules to encourage more "high-tech and innovative" companies to have IPOs and these companies are exempted from the positive earnings requirement.

23%, and 27% respectively. Therefore a substantial portion of IPOs have their offer prices set close to the minimum values allowed by the regulation. The practice of using round numbers for the offer price explains why there is not a large fraction of IPOs at a discount of exactly 30%. For example, if the pre-market price is 95, the minimum permitted offer price would be 0.7×95 = 66.5, but the offer price is likely to be 70, resulting in a price discount of 26.3%.

Despite the similar pre-market and similar IPO institutions, the average underpricing level changes drastically due to the regulatory constraint. This pattern is consistent with the notion that agency problems are a main cause of underpricing, and the underpricing level decreases when the regulation constrains the underwriters' bargaining power, to the benefit of issuers. The results are consistent with the findings of Ince (2014), who also finds little support for the Benveniste and Spindt (1989) mechanism design theory's predictions. Overall, the results we present in this section are consistent with the agency hypothesis, and explain why underpricing can remain high in a setting with little valuation uncertainty and information asymmetry.

6. Conclusions

We study a unique pre-IPO market that has an organized trading platform and is mandatory for firms aiming for an IPO – the Emerging Stock Market in Taiwan. We find that the pre-market trading achieves price discovery to a large degree—as the date of an IPO is approached, the price becomes very informative about the stock's after-IPO value. The pre-market price therefore should be very useful in setting the IPO offer price, thus making the biggest challenge in the IPO process less of a challenge.

We indeed find that the IPO offer price largely depends on the pre-market price. The pre-

market price-multiple alone explains about 90% of the variation in the offer price-multiple. After taking into account the issuer's own pre-market price, peers' prices are no longer important in determining the offer price. Moreover, the more volatile or riskier the stock is, and the less informative the pre-market price is, the greater is the discount taken in setting the offer price relative to the pre-market price (and similarly, the higher the first day return). These results are consistent with the prediction of asymmetric information bookbuilding theories.

Despite the informative pre-market price, however, IPO underpricing remains at a high average level, 55.3%, in contrast to the prediction of asymmetric information-based bookbuilding theories. We provide evidence that underwriters have monetary incentives to underprice shares—both their fees collected from investors and their brokerage revenues increase when underpricing increases. We also find that the stronger are the underwriter's incentives to underprice and the stronger are their bargaining powers, the higher is the underpricing. Our results therefore suggest that agency problems can lead to high levels of IPO underpricing even when there is little information asymmetry or valuation uncertainty about the stock.

Our study has several policy implications. We demonstrate the usefulness of a pre-IPO market in terms of price discovery. We show that liquidity is a key factor in determining the price efficiency on such a market. Consequently, restrictions on institutional participation in ESM trading may have the effect of making the ESM less liquid and informative than it could be. We also observe that the liquidity of the ESM trading remains low before the firm applies for an IPO, and that liquidity does not necessarily increase with the number of days the stock is traded. These facts therefore raise a question regarding the usefulness of prolonged trading before IPO application when there is little attention to, and a lot of uncertainty about, the firm. ESM trading

does, however, allow for greater risk-sharing for pre-IPO shareholders than if it did not occur.

In spite of the information acquired about market demand through ESM trading, the average first-day return of 55.3% with bookbuilt IPOs is far higher than the 7.7% average underpricing reported for 84 IPO auctions in Taiwan during 1995-2000 by Chiang, Qian, and Sherman (2010). Since underwriters enjoy the most flexibility and discretion over the pricing and allocation of shares under the bookbuilding method (as opposed to the auction or fixed-price offering method), it is the method that is most vulnerable to agency problems. Our findings therefore cast doubt on the benefit of the bookbuilding method, especially in the presence of a pre-IPO market from which price discovery is largely achieved.

Our study also raises questions about the effectiveness of private contracting in addressing agency problems in the security issuance market when the underwriters have market power. It is not clear why the market (in Taiwan as well as worldwide) does not use a fee structure contingent on the level of underpricing to discourage deliberate underpricing. Our results show that regulations and market infrastructures set up by the regulations are important in determining the relative bargaining powers of different players and therefore matter to the equilibrium. There is, however, always a risk in over-regulating. Further research on the effects of regulation on the IPO market, and more broadly, the design of primary market microstructures, will be useful.

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Table 1
Firm characteristics

The sample includes 218 Taiwanese firms that conducted IPOs during 10/2005-02/2011. NT$ refers to New Taiwan Dollars. All NT$ values are deflated to constant year 2011 NT$ based on Taiwan's CPI index. The exchange rate at the end of year 2011 is US$1 = NT$30.29. *Debt ratio* is total liabilities over assets. *Return on assets* is annual net earnings relative to assets. We use paired *t*-test for differences in means, and Wilcoxon signed rank test for differences in medians. We do not test the significance of the change in firm age since the value of this variable increases by construction. ***, **, and * denote the difference is significant at the 1%, 5%, and 10% levels, respectively.

Panel A: When starting trading on the Emerging Stock Market.

Variables	*N*	Mean	Median	Std. Dev	Min.	Max.
Firm Age (years)	218	12.14	9.06	8.71	1.37	45.59
Assets (millions of NT$)	218	2,101.32	882.57	5,810.45	135.58	73,343.20
Annual revenues (millions of NT$)	218	1,640.62	652.83	3,115.62	4.45	33,696.54
Debt ratio (%)	218	41.33	41.86	17.36	0.00	87.62
Return on Assets (%)	218	9.22	8.93	10.76	-22.48	63.14
% of firms with VC backing	218	44.95				

Panel B: At the time of IPO application

Variables	*N*	Mean	Median	Std. Dev	Min.	Max.
Firm Age (years)	218	13.87	11.26	8.81	1.93	46.20
Assets (millions of NT$)	218	2,932.63	1,261.53	7,591.07	252.28	76,963.73
Revenues (millions of NT$)	218	2,845.89	1,126.74	7,111.01	59.60	81,786.18
Debt ratio (%)	218	36.19	35.03	15.62	4.00	85.89
Return on Assets (%)	218	14.31	11.96	11.06	-7.10	75.17
% of firms with VC backing	218	56.42				

Panel C: Difference (Panel B – Panel A)

	N	Mean	Median
Firm Age (years)	218	1.74	2.20
Assets (millions of NT$)	218	831.31***	378.96***
Revenues (millions of NT$)	218	1,205.27***	473.91***
Debt ratio (%)	218	-5.14***	-6.83***
Return on assets (%)	218	5.09***	3.03***

Table 2

IPO characteristics

The sample includes 218 firms that conducted an IPO during 10/2005-02/2011. *% of shares issued* is the shares offered in the IPO relative to the number of shares outstanding before the IPO. *P/E* is the IPO offer price relative to the last annual earnings per share by the time of IPO. *Price revision* is the offer price relative to the midpoint of the initial price range, minus one, expressed as a percentage. *Price discount* is one minus the ratio of the offer price over the closing price on the pre-pricing day on the ESM. *Expected initial return* is the ratio of the closing price on the pre-pricing day on the ESM over the IPO offer price minus one, expressed as a percentage. *Initial return* is the ratio of first trading day closing price over the IPO offer price minus one, expressed as a percentage. In Panel B, the 2005 and 2011 number of IPOs are part-year totals. TWSE is the Taiwan Stock Exchange, and GTSM is the Gre Tai Securities Market. The mean initial returns are equally weighted. *Post-issue market cap* equals shares outstanding after the issuance times either the offer price or the closing price on the first trading day on TWSE or GTSM. All NT$ values are deflated to constant year 2011 NT$ based on Taiwan's CPI index.

Panel A: IPO characteristics

Variables	*N*	Mean	Median	Std. Dev	Min.	Max.
IPO Proceeds (NT$, millions)	218	495.33	210.89	1,445.85	18.63	18,186.18
% of shares issued	218	10.42	10.53	2.19	2.26	24.06
% of IPOs on TWSE	218	30.73				
P/E	218	119.15	11.69	1,495.86	-51.55	22,100
P/E after excluding 3 outliers	215	18.40				
Price revision (%)	218	0.13	0	4.64	-14.29	11.11
Price discount (%)	218	33.03	31.42	14.14	2.78	82.03
Expected initial return (%)	218	58.44	45.82	48.35	2.86	456.52
Initial return (%)	218	55.32	36.74	68.06	-10.00	726.09
Percentage with negative initial returns (%)	218	6.42				
Post-issue market cap (NT$, millions)						
at offer price	218	5,955.26	2,383.98	16,989.74	234.73	160,547.82
at first closing market price	218	8,292.82	3,451.73	21,670.92	324.78	231,188.86

Panel B: Initial returns by year

	All		TWSE		GTSM	
	N	IR, %	*N*	IR, %	*N*	IR, %
2005	8	59.45	3	52.77	5	63.46
2006	42	55.97	8	39.31	34	59.89
2007	51	60.03	16	34.52	35	71.69
2008	33	29.80	11	32.71	22	28.35
2009	37	79.50	17	85.17	20	74.68
2010	35	49.70	10	22.46	25	60.60
2011	12	42.28	2	25.51	10	45.63
All	218	55.32	67	46.39	151	59.28

Table 3

Price accuracy

Price error is the ratio of the pre-IPO price on ESM over the closing price on the first trading day on the TWSE or GTSM, minus one, and expressed as a percentage. *Price inaccuracy* is the absolute value of price error. For the row "6 months before pricing (after apply IPO)", we restrict the sample to those for which the hiatus between IPO application and pricing is at least 6 months. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Variables	*N*	Mean	Median	Std Dev	Min.	Max.
Price inaccuracy (%):						
6 months before pricing	218	45.76***	34.48***	42.86	1.49	243.91
6 months before pricing (after apply IPO)	86	50.80***	35.10***	50.44	2.33	243.91
3 months before pricing	218	34.97***	27.88***	31.92	0.00	215.32
2 months before pricing	218	29.47***	24.90***	25.37	0.00	168.15
1 month before pricing	218	21.58***	18.82***	16.88	0.52	93.55
the day before pricing	218	14.78***	12.96***	11.43	0.46	56.91
4^{th} day after pricing	215	11.96***	10.73***	8.81	0.00	53.40
Price error (%):						
6 months before pricing	218	3.65	-12.95	62.66	-90.14	243.91
6 months before pricing (after apply IPO)	86	11.51	-2.86	70.86	-85.79	243.91
3 months before pricing	218	5.84*	-2.83	47.04	-83.42	215.32
2 months before pricing	218	4.07	-0.13	38.73	-78.84	168.15
1 month before pricing	218	1.85	0.32	27.38	-58.42	93.55
the day before pricing	218	6.04***	6.50***	17.71	-40.87	56.91
4^{th} day after pricing	215	6.56***	7.43***	13.35	-32.17	53.40

Table 4

Determinants of pre-market price inaccuracy

The dependent variable is the percentage price inaccuracy on the pre-pricing day, i.e., the absolute value of the ratio of the closing price on the pre-pricing day on the ESM over the closing price on the first trading day on the TWSE or GTSM, minus one, multiplied by 100. *%Zero trading* is the percentage of trading days with no trading during the 3 months prior to IPO pricing. *%Zero return* is the percentage of trading days with zero stock return or no trading during the 3 months prior to IPO pricing. *Amihud ratio* is the daily average of the absolute value of the percentage stock return over dollar trading volume (in millions of NT$) during the 3 months prior to IPO pricing. *Volatility* is the standard deviation of daily percentage stock returns during the 3 months prior to IPO pricing. *VC dummy* equals to 1 if the firm is backed by venture capital and zero otherwise. *Return on assets* is annual earnings relative to assets, measured as a percentage. *t*-statistics are adjusted for heteroskedasticity. ***, **, and * denote significance at the 1, 5, and 10 percent level, respectively.

Model	(1)		(2)		(3)		(4)		(5)		(6)	
Variables	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value
%Zero trading	0.15	(2.73)***	0.15	(2.19)**								
%Zero return					0.11	(2.68)***	0.12	(2.52)**				
Amihud ratio									0.19	(2.04)**	0.23	(2.03)**
Volatility			0.43	(0.75)			0.54	(0.91)			0.28	(0.48)
VC dummy			0.91	(0.53)			1.11	(0.65)			1.11	(0.66)
Return on assets			0.06	(1.02)			0.07	(1.08)			0.09	(1.31)
Log(assets)			-1.08	(-1.49)			-1.04	(-1.44)			-1.14	(-1.56)
Intercept	13.29	(15.84)***			11.81	(9.92)***			13.60	(16.26)***		
Industry dummies			yes				yes				yes	
Year dummies			yes				yes				yes	
R^2	0.048		0.135		0.044		0.142		0.033		0.146	
N	218		216		218		216		216		216	

Table 5

Relative importance of pre-market price and peer firms' prices in determining IPO offer price

When calculating the P/E ratio, we exclude two issuing firms with negative EPS and one firm with an outlier P/E value. *Offer-price P/E* is the ratio of the IPO offer price relative to the annual EPS prior to the IPO. *Pre-market P/E* is the ratio of the closing price on the pre-pricing day on the ESM relative to the annual EPS. *Industry-median P/E* is the median P/E ratio for firms in the same industry as the issuing firm, where the P/E ratio is based on a peer firm's closing price on the issuing firm's pre-pricing day and the peer firm's annual EPS prior to that day. For each issuing firm, we identify a matching firm that is traded on either TWSE or GTSM, is in the same industry and has the closest asset value. *Matching-firm P/E* is the ratio of the matching firm's closing price on the issuing firm's pre-pricing day relative to the matching firm's annual EPS prior to that day. *t*-statistics are adjusted for heteroskedasticity. ***, **, and * denote significance at the 1, 5, and 10 percent level, respectively.

Panel A: Summary statistics

Variables	*N*	Mean	Median	Std. Dev	Minimum	Maximum
Offer-price P/E	215	18.40	11.70	27.75	1.85	257.14
Pre-market P/E	215	29.53	18.04	45.44	2.51	454.29
Industry-median P/E	215	15.83	15.00	5.41	5.20	29.75
Matching-firm P/E	215	29.76	14.95	49.62	5.36	284.09

Panel B: Offer price P/E as the dependent variable

Model	(1)		(2)		(3)		(4)		(5)	
Variables	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value
Pre-market P/E	0.58	(15.40)***			0.59	(15.41)***			0.58	(15.38)***
Industry-median P/E			0.70	(2.76)***	-0.28	(-1.95)*				
Matching-firm P/E							-0.012	(-0.59)	-0.005	(-0.91)
Intercept	1.16	(1.62)	7.29	(1.66)*	5.38	(2.80)***	18.77	(8.39)***	1.31	(1.89)*
R^2	0.914		0.019		0.917		0.001		0.914	
N	215		215		215		215		215	

Table 6

Determinants of the price discount

The dependent variable is the percentage *Price discount,* defined as one minus the ratio of the offer price over the closing price on the pre-pricing day on the ESM. *Price inaccuracy* is the absolute value of price error, which is the ratio of the pre-IPO price on ESM over the closing price on the first trading day on the TWSE or GTSM, minus one. *Volatility* is the standard deviation of percentage daily stock returns during the 3 months prior to IPO pricing. *VC dummy* equals to 1 if the firm is backed by venture capital and zero otherwise. *Return on assets* is annual earnings relative to assets, in percent. *Assets* are measured in terms of 2011 purchasing power. *Expected price inaccuracy* is the predicted value of price inaccuracy from Table 4 except excluding liquidity variables from the logit regression. *t*-statistics are adjusted for heteroskedasticity. ***, **, and * denote significance at the 1, 5, and 10 percent level, respectively.

Model	(1)		(2)		(3)		(4)		(5)		(6)		(7)	
Variables	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value
Price inaccuracy	0.23	(3.04)***									0.17	(2.20)**		
Volatility			3.13	(3.60)***							2.37	(2.85)***		
VC dummy					-0.43	(-0.22)					-1.35	(-0.72)		
Return on assets							-0.02	(-0.20)			-0.12	(-1.41)		
Log(assets)									-3.37	(-3.35)***	-3.82	(-3.60)***		
Expected price inaccuracy													0.86	(3.13)***
Intercept	29.58	(19.66)***	21.87	(7.50)***	33.27	(22.00)***	33.25	(22.38)***	57.73	(7.73)***			20.53	(5.39)***
Industry dummies											yes			
Year dummies											yes			
R^2	0.036		0.110		0.000		0.000		0.049		0.332		0.049	
N	218		216		218		218		218		216		216	

Table 7
Underwriting fees and intended price discount

The FPO subscription ratio is the total demand from the fixed-price offering tranche, relative to the shares sold through that tranche. The percentage FPO fee is 8.5 times the FPO subscription ratio, divided by the offer price, and multiplied by the ratio of 100% over 1,000 shares per lot. The *bookbuilding fee* is the fee bookbuilding investors pay for each share allocated to them, relative to the offer price, multiplied by 100%. The *total investor fee* is the weighted average of the FPO fees and the bookbuilding fees, where the weighting variable is the proceeds raised in the two tranches. *Intended price discount* equals one minus the ratio of the midpoint of the price range over the closing price on the day before bookbuilding starts, multiplied by 100%. *Volatility* is the standard deviation of percentage daily stock returns during the 3 months prior to IPO pricing. *VC dummy* equals one if the firm is backed by venture capital and zero otherwise. *Return on assets* is the percentage annual earnings relative to assets. *Assets* are measured in terms of 2011 purchasing power. *t*-statistics are adjusted for heteroskedasticity. ***, **, and * denote significance at the 1, 5, and 10 percent level, respectively.

Panel A: Summary statistics

Variables	*N*	Mean	Median	Std. Dev	Min.	Max.
FPO subscription ratio	204	89.82	60.87	168.95	0.43	2,300.95
FPO fee (%)	204	1.98	1.37	1.89	0.01	12.58
Bookbuilding fee (%)	218	1.68	0	2.09	0	8.70
Total investor fee (%)	218	1.67	1.20	1.70	0	8.00
Intended price discount (%)	218	32.08	30.48	14.16	-0.81	82.31

Panel B: Regressions. The dependent variable is the percentage total investor fee.

Model	(1)		(2)	
Variables	Coeff.	t-value	Coeff.	t-value
Intended price discount	0.04	(5.53)***	0.03	(3.18)***
Volatility			-0.03	(-0.34)
VC dummy			0.44	(2.22)**
Return on assets			-0.01	(-2.14)**
Log(assets)			-0.21	(-1.62)
Intercept	0.41	(1.78)*		
Industry dummies			yes	
Year dummies			yes	
R^2	0.107		0.424	
N	218		216	

Table 8

Underwriter brokerage revenues and expected money left on the table from IPOs

The dependent variable is the natural logarithm of an underwriter's brokerage revenue in the current year or next year, respectively. The regressions in this table include observations of lead underwriter-years where the lead has underwritten at least one IPO. Annual brokerage revenues and the total money left on the table are measured in millions. We exclude years where the underwriter experiences a merger and acquisition. For each IPO, we compute expected money left on the table as the shares issued times the difference between the pre-market price on the day before IPO pricing and the offer price. For each underwriter-year, we sum up the *total money left on the table* from the IPOs the bank lead underwriters. The market return is the contemporaneous market return, measured as a percentage. *t*-statistics are adjusted for heteroskedasticity. ***, **, and * denote significance at the 1, 5, and 10 percent level, respectively.

Model	Ln(Current year's brokerage revenue) (1)		Ln(Next year's brokerage revenue) (2)	
Variables	Coeff.	t-value	Coeff.	t-value
Ln(Total money left on the table)	0.054	(2.20)**	0.048	(2.17) **
Market return	0.075	(1.58)	0.073	(1.48)
Underwriter dummies	yes		yes	
R^2	0.930		0.958	
N	75		69	

Table 9

Underwriter impact on underpricing

Panel A reports the mean *price discount* for subsamples categorized by one of three variables. We categorize an IPO observation as having high underwriter incentive/power to underprice if it has (Column 1) above-median *lead percentage*, or (Column 2) above-median *previous price discount,* or (Column 3) an above-median value of *issue again*. The other IPOs are categorized into low incentive/power subsamples. Panel B estimates regressions with price discount as the dependent variable. *Price discount* is one minus the ratio of the offer price over the closing price on the pre-pricing day on the ESM, multiplied by 100%. *Lead percentage is* the percentage of shares sold by the lead underwriter. *Previous price discount* is the average price discount in the previous three years. *Issue again* is a dummy variable equal to one if the firm issues any public securities (seasoned equity offerings or corporate bonds) again in the next two years. *Assets* are measured in terms of 2011 purchasing power. *Volatility* is the standard deviation of percentage daily stock returns during the 3 months prior to IPO pricing. *VC dummy* equals one if the firm is backed by venture capital and zero otherwise. *Return on assets* is the percentage annual earnings relative to assets. *t*-statistics are adjusted for heteroskedasticity. ***, **, and * denote significance at the 1, 5, and 10 percent level, respectively.

Panel A: Mean percentage price discount by subsamples

	Measure of underwriter incentive/power		
	Lead percentage (1)	Previous price discount (2)	Issue again (3)
High underwriter incentive/power	35.09	35.42	36.42
Low underwriter incentive/power	30.92	31.34	30.86
Difference	4.17**	4.08**	5.56***

Panel B: Regression results with the percentage price discount as the dependent variable

Model	(1)		(2)		(3)	
Variables	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value
Lead percentage	0.14	(1.82)*				
Previous price discount			0.27	(1.98)**		
Issue again					4.27	(2.30)**
Ln(assets)	-3.27	(-3.06)***	-4.93	(-4.63)	-3.69	(-3.57)***
Volatility	2.78	(4.33)***	2.28	(3.50)***	2.56	(4.01)
VC dummy	-0.82	(-0.42)	-1.96	(-1.02)	-1.48	(-0.77)
Return on assets	-0.12	(-1.45)	-0.17	(-1.95)*	-0.12	(-1.41)
Industry dummies	yes		yes		yes	
Year dummies	yes		yes		yes	
R^2	0.351		0.352		0.359	
N	215		195		215	

Table 10

Two regulatory regimes

Panel A compares IPO firm characteristics during our sample period (October 2005–February 2011) and the post-sample period (March 2011–December 2014). IPOs during the post-sample period are subject to a rule that the IPO offer price must not be lower than 70% of the average ESM trading price during the 10 days before the bookbuilding announcement is submitted to the Taiwan Securities Association. Panel B compares initial return and price discount of the two regimes. *Initial return* is the ratio of first trading day closing price over the IPO offer price minus one, multiplied by 100%. *Price discount* is one minus the ratio of the offer price over the closing price on the pre-pricing day on the ESM, multiplied by 100%. We use *t*-test for differences in means, and Wilcoxon-Mann-Whitney test for differences in medians. *REG* dummy equals to one if the observation is from the post-sample period, and zero otherwise. *t*-statistics are adjusted for heteroskedasticity. ***, **, and * denote significance at the 1, 5, and 10 percent level, respectively.

Panel A: IPO firm characteristics in two regulatory regimes

	Sample period			Post-sample period			Difference	
	N	Mean	Median	N	Mean	Median	Mean	Median
Firm Age (years)	218	13.87	11.26	172	16.15	13.46	-2.28**	-2.20***
Assets (millions of NT$)	218	2932.63	1261.53	172	5774.67	1278.19	-2842.04	-16.66
Annual revenues (millions of NT$)	218	2845.89	1126.74	172	3053.62	1082.34	-207.73	44.40
Debt ratio (%)	218	36.19	35.03	172	38.92	37.86	-2.73	-2.84
Return on Assets (%)	218	14.31	11.96	172	8.67	8.92	5.64***	3.04***
% of firms with VC backing	218	56.42	100.00	172	58.14	100.00	-1.72	0.00

Panel B: Comparison of underpricing in two regulatory regimes

	Sample period			Post-sample period			Difference	
	N	Mean	Median	N	Mean	Median	Mean	Median
Initial return (%)	218	55.32	36.74	172	26.79	22.52	28.53***	14.22***
Price discount (%)	218	33.03	31.42	172	23.01	21.88	10.02***	9.55***