

Accepted Manuscript

U.S. exchange upgrades: Reducing uncertainty through a two-stage IPO

Rebel A. Cole , Ioannis V. Floros , Vladimir I. Ivanov

PII: S1042-9573(18)30063-9
DOI: <https://doi.org/10.1016/j.jfi.2018.07.003>
Reference: YJFIN 802



To appear in: *Journal of Financial Intermediation*

Received date: 8 February 2018
Revised date: 17 July 2018
Accepted date: 29 July 2018

Please cite this article as: Rebel A. Cole , Ioannis V. Floros , Vladimir I. Ivanov , U.S. exchange upgrades: Reducing uncertainty through a two-stage IPO, *Journal of Financial Intermediation* (2018), doi: <https://doi.org/10.1016/j.jfi.2018.07.003>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

U.S. exchange upgrades: Reducing uncertainty through a two-stage IPO

Rebel A. Cole
Florida Atlantic University
Boca Raton, FL 33431
coler@fau.edu
(561) 297-4969

Ioannis V. Floros
University of Wisconsin-Milwaukee
Milwaukee, WI 53211
ivfloros@uwm.edu
(414) 229-4369

Vladimir I. Ivanov^{*}
U.S. Securities and Exchange Commission
Washington, D.C., 20549
ivanovv@sec.gov
(202) 551-5307

This version: July, 2018

Abstract: We examine the effects on IPO uncertainty of an alternative going-public mechanism – the two-stage IPO, where a firm first gets quoted on the OTC market, and then upgrades to a national exchange where it first issues public equity. We find that a two-stage IPO firm experiences lower underpricing and return volatility than does a similar traditional IPO firm. Our study is the first to analyze the impact of U.S. pre-IPO disclosure and liquidity on levels of uncertainty and pricing at the IPO stage. We find that greater disclosure and liquidity during the first stage leads to greater reduction in IPO uncertainty. We control for the potentially endogenous nature of the two-stage IPOs by using a difference-in-difference analysis that utilizes two exogenous OTC market events.

Keywords: Initial Public Offering, Two-stage IPO, Pre-IPO market, Exchange upgrade, Underpricing, Information asymmetry, Stock volatility, Difference-in-difference test

^{*} Corresponding author, The Securities and Exchange Commission, as a matter of policy, disclaims responsibility for any private publication or statements by and of its employees. The views expressed herein are those of the author and do not necessarily reflect the views of the Commission or of the author's colleagues on the staff of the Commission.

We are grateful for comments from Matthew Billett, Kimberly Cornaggia, David Florysiak, Arup Ganguly, Jon Garfinkel, Peter Iliev, Craig Lewis, Kate Litvak, Nandu Nagarajan, Stanislava Nikolova, Michel Robe, Ajay Singh, Bin Srinidhi, Ram Venkataraman; from seminar participants at American University, George Mason University, at the University of Delaware, at the University of Nebraska-Lincoln, at the University of Memphis, at the University of Texas at Arlington at the U.S. Securities and Exchange Commission and the Athens Laboratory of Business Administration; from session participants at the 2015 Financial Management Association meetings, the EFMA 2016 annual meetings and the 2017 FMA European Conference. We also would like to thank Samuel Adams, Marco Enriquez, and Peter Iliev for helping us with textual analysis of the registration documents and Dan Zinn for providing us with useful institutional information on the OTC market. Part of the analysis has been completed while Floros was at Iowa State University.

I. Introduction

When a company is about to go public, potential investors usually face significant uncertainty regarding its valuation and growth prospects. This uncertainty, combined with the presence of differentially informed investors, result in underpricing at the time of the initial public offering (IPO). Leland and Pyle (1977) and Myers and Majluf (1984) show that greater levels of informational asymmetries cause firms to issue proportionately less outside equity. Rock (1986) and Benveniste and Spindt (1989) develop models in which asymmetric information increases the underpricing of initial public offerings (IPOs). These information asymmetry models of IPO underpricing imply that firms going public could reduce underpricing by increasing transparency.

The recent emergence of pre-IPO markets (e.g., in the UK, Germany, and Taiwan), where a private firm's securities are listed and traded before the IPO, offers a way to reduce a firm's valuation uncertainty and, hence, lead to lower underpricing. Existing research, however, provides mixed evidence on the ability of pre-IPO markets to reduce underpricing. For example, Derrien and Kecskes (2007) find that U.K. firms listing first on the London Alternative Investment Market (AIM) without issuing equity, and subsequently issuing public equity on the same market, have lower underpricing. In a similar vein, Loffler et al. (2005) find that a few days of trading in the active pre-IPO German market result in informative pre-IPO prices and uninformed investors are not at a disadvantage as they can monitor pre-IPO trading. On the other hand, a recent study by Chang et al. (2017), which analyzes the mandatory pre-IPO market in Taiwan, finds that despite the informative pre-market price, underpricing remains substantial even in the presence of a pre-IPO market.

We identify and analyze an alternative path for going public that has gained popularity in the U.S. during the last decade. The process is an initial quotation on the over-the-counter (OTC) market (the first stage), followed by an upgrade to a main U.S. stock exchange and an IPO on that exchange (the second stage), thus a two-stage IPO. The firm's first public-equity offering occurs during the second stage of the process, either concurrently with or following the upgrade. We examine how pre-IPO trading (i.e., the first stage) affects the level of information asymmetry at the time of a firm's IPO on a national exchange measured in two ways: by IPO underpricing and post-offering return volatility.

The unique feature of the U.S. pre-IPO market is that it is long-lasting and allows voluntary disclosure while, unlike pre-IPO markets in other countries, it is also opaque, frequently

fraudulent, more volatile, and less liquid. Thus, we are able to test the effects of disclosure, liquidity, and time spent on pre-IPO markets on valuation uncertainty as measured by underpricing and stock price volatility. These effects are not immediately obvious because of the above-mentioned characteristics of the U.S. pre-IPO market.

The extant studies that analyze pre-IPO markets all focus on a trading venue that is located on a national exchange, where liquidity is high and all firms provide regular disclosures.¹ Whether providing disclosure while being traded on the OTC helps resolve information uncertainty prior to future public equity offering, is an open question. Disclosure may receive minimal investor attention due to relatively low levels of liquidity and analyst coverage, or the higher levels of fraud in this market (for examples of instances of OTC market fraud, see Bushee and Leuz (2005), Jiang, Petroni and Wang (2016), and White (2016))

Our setting allows us to analyze the impact of the first stage disclosure and liquidity on the second stage uncertainty and pricing. The promulgation of the JOBS Act offered incentives for firms to stay private for a longer time period. Thus, more firms may end up having shares quoted and traded on the OTC market prior to doing an IPO, which would increase the importance of this pre-IPO market. Anecdotal evidence suggests that this may be the case. For example, Cromwell Coulson, the CEO of OTC Markets Inc., states the following (see Silchenko (2015)): "...Last year (i.e., 2014), there were 83 "exchange graduates" up-listing from OTC marketplaces to a NYSE, NASDAQ or NYSE MKT listing. It is a score given the fact that for example TSX Venture (Canada) and LSE AIM Market (UK) got only 22 and 5, consequently."

Figure 1 compares the two-stage IPO to the traditional IPO. In a two-stage IPO, a private firm's shares are first quoted on the OTC market (stage one), and then are upgraded to a national exchange (NYSE, NASDAQ, or AMEX up to 2008) without any underwriter participation. After getting quoted on the OTC market, a firm can decide to provide disclosure to investors by registering shares issued in prior private offerings with the SEC and filing periodic statements such as 10-Ks and 10-Qs, or by providing customized disclosure documents without SEC registration. When an OTC-traded firm decides to upgrade to a national stock exchange, all the national exchange's listing requirements need to be met.

Given the nature of the two-stage IPO process, we first hypothesize that pre-IPO trading and dissemination of information about the firm occurring during the first stage of the process

¹ See Loffler, Panther and Theissen (2005), Derrien and Kecskes (2007), Brooks, Mathew, and Yang (2014), and Chang, Chiang, Qian, and Ritter (2017).

leads to some resolution of valuation uncertainty. In turn, should result in lower underpricing and return volatility in a two-stage IPO than in a traditional IPO (the *lower information asymmetry* hypothesis). Schrand and Verrecchia (2005) provide evidence that greater disclosure frequency in the pre-IPO period is associated with lower underpricing. The extent to which a two-stage IPO reduces valuation uncertainty, if at all, is an empirical question.

Second, we expect that the longer time two-stage IPOs have spent on the OTC market, the more they disclose, and the more liquid their shares are, the lower their level of information asymmetry will be compared to traditional IPOs. Thus, we hypothesize that the information asymmetry levels of two-stage IPOs are inversely related to the length of time the firm remains on the OTC, the liquidity and the extent of disclosure during OTC quotation (the *OTC information dissemination* hypothesis).

We test the *lower information asymmetry* hypothesis by comparing the levels of uncertainty associated with two-stage IPOs to those of similar firms that follow the traditional IPO process. We use two measures of uncertainty: (1) the degree of underpricing at the time of IPO, and (2) the 60-day post-IPO stock return volatility.

We test the *OTC information dissemination* hypothesis by analyzing the relation of information asymmetry with the quotation duration on the OTC, the zero trading days' illiquidity measure and the total number of U.S. Securities and Exchange Commission (SEC) disclosure documents. We compare the uncertainty/information asymmetry surrounding two-stage IPOs at the time of their first public equity offerings and their upgrades to a national exchange to that of traditional one-stage IPOs.

We are careful to address the potential endogeneity of the two-stage IPO choice. If our main independent variable – the two-stage IPO indicator variable – is a choice variable, then the OLS analysis will yield inconsistent coefficient estimates. We use a difference-in-difference estimation to address self-selection bias and test the link between pre-IPO disclosure and the level of information asymmetry. Our exogenous event is a sequence of two policy changes that occur in the OTC market – the introduction of real-time pricing data (RealTime+) and the change in the informational tiers structure, specifically the launching of the OTCQB marketplace that is considered to be one of the two upper OTC market tiers. To the best of our knowledge, RealTime+

is a new OTC market policy event that has not been analyzed in the literature.² We show that the introduction of these two exogenous events is significantly negatively associated with subsequent return volatility. We also address the possibility that firms may self-select into the two-stage IPO process by using propensity-score matching and a treatment-effect model.

Compared to a traditional IPO, we find that two-stage IPOs experience significantly lower underpricing at their first public equity offering, which occurs when it conducts an underwritten offering at the same time as, or after, its upgrade from the OTC market to a national exchange. On average, the underpricing for our sample of two-stage IPO firms is lower by as much as 23% compared to a sample of matched traditional IPO firms. Likewise, we find that a two-stage IPO firm has lower post-offering volatility than a traditional IPO firm, although the effect of a two-stage IPO on volatility is not as strong as its effect on underpricing. Our results are robust to controlling for the potentially endogenous nature of the two-stage IPOs.

Next, we ascertain whether the first, second, or both stages of the two-stage IPO reduce information uncertainty. The above-mentioned results could be simply due to the fact that two-stage IPOs typically do not issue equity at the time of the upgrade to a national exchange, but, instead, do so during the months following the upgrade. For a traditional IPO, prior disclosure does not exist because the firm's first public offering coincides with its listing on a national exchange. In other words, it is possible that the second stage of a two-stage IPO leads to lower uncertainty, while the first stage has no effect on uncertainty.

In additional analysis, we compare the uncertainty of the two-stage IPOs following the upgrade to a national exchange, as measured by stock return volatility, to that of similar traditional IPOs in order to test whether the first stage of the two-stage IPO process plays a role in the reduction of uncertainty. We find that the first-stage significantly reduces valuation uncertainty: two-stage IPOs have significantly lower stock-return volatility during the two months following their upgrade to a national exchange than do similar traditional IPOs. We also find that two-stage IPO firms providing more significant disclosures to investors while being quoted on the OTC

² The informational tiers introduction has been analyzed in Jiang, Petroni and Wang (2016). In untabulated results, we find that OTCQB dollar volume increases by 201.6% from 2009 to 2010 with the OTCQB's share increasing by 52% and amounting to 22.94% of the total OTC market dollar volume traded during this time period. The introduction of the tiers incentivized enlisting firms to provide higher levels of disclosures, which they had to maintain in order to remain being quoted on these upper tiers. We thank Dan Zinn and the OTC market general counsel office for providing us with the respective summary statistics.

market, and those with higher liquidity, experience greater reductions in uncertainty than other two-stage IPO firms.

Further, we study the change in the degree of information asymmetry during the time between an initial OTC market quotation and the IPO on a national exchange. Using a measure of uncertainty that is based on the tone of a company's offering documents (Loughran and McDonald, 2011, 2013), we find that, for SRMs following the two-stage IPO process, the degree of uncertainty decreases significantly from the time of OTC market listing to the time of first equity offering on a national exchange.

Our study contributes to various strands of the IPO literature. It sheds light on the debate of whether IPO uncertainty levels decrease with pre-IPO trading and disclosure for firms that decide to get upgraded to a national stock exchange. Our study deals with the endogeneity of the pre-IPO market choice by introducing exogenous events that take place in the pre-IPO market.

Second, our study contributes to the strand of the IPO literature that studies the effect of information asymmetry on the underpricing of IPO firms. A number of studies (see Ritter and Welch, 2002, for a review) argue that the presence of information asymmetry at the time of going public generates underpricing. All of these studies, however, examine traditional IPOs. Our results suggest that a two-stage IPO significantly reduces underpricing and post-offering volatility.

Lastly, our study has policy implications as the SEC ponders ways to provide liquidity for small, private firms such as allowing the creation of venture exchanges. For instance, the revised "Main Street Growth Act", which passed the House on July 10th, 2018, could establish a new class of private, secondary markets that would cater to the needs of financially constrained small cap firms. Our findings provide evidence on the way the OTC market potentially creates an alternative path for small firm capital formation to raise financing at relatively low cost after getting upgraded to main U.S. stock exchanges.

II. Data and Summary Statistics

In this section, we describe our data sources, document how we create our analysis samples and provide summary statistics on the samples of two-stage IPOs and traditional IPOs.

II.A. Data sources and sample selection

We identify upgraded firms from SEC EDGAR filings (forms CERTAMX, CERTNASD or CERTNYS) certifying that the firm's security is approved for listing on AMEX, NASDAQ or

NYSE during the period 1996-2013. Table 1 describes the filters we use to construct our sample. Because these filings could include different types of securities than equity, we match sample firms with CERTAMX, CERTNASD or CERTNYS forms with data from the Center for Research in Security Prices (CRSP) and Compustat, keeping only listings pertaining to common equity. If a firm has more than one listing form (e.g., its stock is first upgraded to NASDAQ and then moves to NYSE), we use only the first listing in our analysis. We further exclude financial firms (Standard Industrial Classification (SIC) between 6000 and 6999), utilities (SIC between 4900 and 4999), firms that are cross-listed and firms that switch between national exchanges (e.g., they are listed on NYSE prior to 1996 and later switch to NASDAQ). We next merge the remaining firms with a list of IPOs from Securities Data Corporation (SDC) New Issues database and delete any traditional IPOs. We end up with 462 firms that are initially quoted on the OTC market and get upgraded to a national exchange (NYSE, NASDAQ, or AMEX).

Because we want to identify firms that are truly two-stage IPOs, and not fallen angels (i.e., firms initially listed on national exchanges that subsequently migrate, for various reasons, to the OTC market) or penny-stock IPOs (firms that undertake their IPOs on the OTC market), we drop any firm with a public equity offering prior to the upgrade date. Prior equity offerings are identified by merging our sample firms with the SDC Seasoned Equity Offerings (SEOs). Next, we manually check the filings of each remaining firm for the presence of S-1 or S-3 offering documents (that will indicate a public offering) prior to the upgrade date, and also review the 10-K statements for the periods preceding the exchange upgrade date for information on whether a firm is listed on a national exchange. This further reduces our sample by 131 firms to 331 two-stage IPOs. Since we are interested in capital raising after the upgrade to a national exchange, we match these 331 firms with a list of SEOs from SDC's New Issues database during the period 1996-2013. Of the 331 upgraded firms, 148 firms have one or more public equity offerings after the upgrade and 183 do not issue public equity after the upgrade.

We drop firms whose public equity offerings come more than five years after the upgrade to a national exchange. This reduces our two-stage IPO sample by 24, leaving us with 124 two-stage IPOs that issue public equity for the first time in their history within five years after the upgrade and 183 upgraded firms that do not issue public equity after their upgrades ("Upgrades").³

³ As a robustness check, we add the 24 firms whose public offerings come more than five years after the upgrade to the two-stage IPO sample and re-run the analysis. The results on underpricing and volatility remain qualitatively unchanged from those reported here.

To gauge any potential differential impact of the trading platform (e.g., OTCQB, OTCQX, Pink Sheets, and OTC BB) on the underpricing and stock return volatility, we hand-check how many firms from our sample are listed on the various trading platforms of the OTC market.⁴ We find that 92.2% of the two-stage IPOs and the upgrades are quoted on the OTC BB and only 5.8% and 2.0%, respectively, are quoted on the upper tiers OTCQB/OTCQX and the Pink Sheets. The vast majority of our two-stage IPOs and upgrades face mandatory SEC reporting requirements prior to getting upgraded to main U.S. stock exchanges. This fact leads us to believe that the two-stage IPO firms choose to subject themselves to a more rigorous disclosure regime, probably with the expectation that someday in the future they will go public on a national exchange.

We also trace SRMs, which encompass all firms that become quoted on the OTC market by acquiring a shell company. SRMs are drawn from the PrivateRaise SRM database and our extended hand-collection of the engaged private firms' financial characteristics ahead of the SRM transaction. The SRM database contains all SRM transactions consummated between November 7, 2005 and December 31, 2013. The initial sample of SRMs obtained from the PrivateRaise database is also filtered based on the following criteria: (a) form 8-K that clearly states that the transaction is indeed an SRM, (b) the deal is between a private company based in the US or abroad and a public firm that is registered pursuant to the 1933 Securities Act and whether the public firm listed on a national market system licensed exchange, (c) the deal involves only two companies, (d) the deal has a reported effective date, (e) neither party in the deal has prior ownership in the other party and (f) financial information is available from Compustat 8-Ks, 8-K/As, 10Ks and SC-14F1s.

The imposition of these filtering criteria leaves us with a total number of 1,320 SRM observations. Of these, 94 upgraded to national U.S. stock exchanges within three calendar years after their SRM completion date. We find that 54 of the 94 upgraded SRMs also undertake an IPO after their upgrade date. For each of the 54 SRM firms, we have detailed information on its financials and institutional ownership prior to, and at, the time of the SRM, which is the time of listing on the OTC market. We note that SRMs, similar to the rest upgrades and two-stage IPOs, have never been traded on main U.S. stock exchanges before and do not conduct any public equity offering while traded on the OTC market.

⁴ In August 2007, the OTC Markets Group (at that point, Pink Sheets LLC) introduced a tier system to differentiate financial and corporate disclosure with the goal being that the two upper tiers, at the beginning the OTCQX (launched March 2007) and then the OTCQB (launched April 2010), become liquid venture marketplaces and the stepping stones to national exchanges, in case firms desire to upgrade.

We compare the sample of two-stage IPOs to a sample of traditional IPOs. We construct our traditional IPO sample using initial public offerings identified in the SDC's New Issues database. The sample period covers 1996-2013. To the raw IPO sample from SDC we apply filters that are used in numerous IPO studies: we exclude issues with an offer price lower than \$1, American Depositary Receipts (ADRs), Real Estate Investment Trusts (REITs), spin-offs, closed-end funds, issues involving tracking stock, unit offerings, rights offerings, blank-check companies, reverse Leveraged Buyouts (LBOs), and issues that are not sold by firm commitment offerings. We also exclude financial firms (SIC codes between 6000 and 6999) and utilities (SIC between 4900 and 4999). We require that two-stage IPOs, Upgrades, and traditional IPOs have positive values for total assets in Compustat and have price and return data available from CRSP. Imposition of these filters leaves us with a traditional IPO sample of 1,903 firms.

For a two-stage IPO, we obtain OTC price quotes for the last 90 trading days from OTC Dealer. Lastly, from SDC's New Issues database we identify a sample of withdrawn traditional IPOs that we use in parts of our analysis. These are firms that initially file for an IPO, then withdraw their IPO filing, and eventually refile and go public after a few years. We have 170 such IPOs.⁵

II.B. Summary statistics

Table 2 presents summary statistics for the samples of two-stage IPOs, Upgrades (those upgraded firms that do not do a public equity offering after the upgrade), and traditional IPO firms. Panel A of Table 2 shows the yearly distributions of the two-stage IPOs, the Upgrades and the traditional IPOs, as well as the annual averages of underpricing and post-IPO return volatility for the two-stage and traditional IPOs. As the table shows, the use of the two-stage IPO route picks up after 2003, and, during the two most severe years of the financial crisis (2008-2009), becomes the most prevalent type of IPO. Part of the reason for this increased activity in two-stage IPOs is the Nov. 2005 effective date of new rules introduced by the SEC with regards to shell companies.⁶ Another possible explanation for the upward trend in two-stage IPOs is the increased difficulty and

⁵ This percentage is aligned with the percentage of withdrawn IPOs (approximately 9%) reported by Dunbar and Foerster (2008) in their earlier IPO sample.

⁶ Effective November 7, 2005 the SEC passed new rules defining shell companies. In detail, the new rules: a) define certain terms, including the "shell company", b) introduce prohibitions on shell companies from utilizing form S-8 and prohibit companies that cease being shell companies from utilizing form S-8 until 60 days after the surviving entity files information equivalent to that which would be required in a form 10 or form 10-SB, c) require companies that cease being shell companies to file a form 8-K within four business days after the closing of the transaction that results in the termination of the shell company status and d) require that the check box to forms 10-Q, 10-QSB, 10-K, 10-KSB and 20-F is added in order to allow public investors and regulators to easily identify shell companies.

cost of going public for smaller companies, as manifested by the lower numbers of traditional IPOs after 2000. Lastly, it is possible that the financial crisis made it difficult for companies to go public via the traditional IPO route, and that's why companies switched to the two-stage approach. It is also worth noting that there may be more upgrades as the OTC's tiers classification has been implemented, which allows firms on the OTC market to differentiate themselves and provide more disclosure.⁷ The average underpricing and post-IPO return volatility also display significant variation over time for both two-stage IPOs and traditional IPOs. It appears that the magnitudes are lower for two-stage IPOs compared to their traditional peers.

Panel B presents summary statistics for the samples of two-stage IPOs and Upgrades regarding the time spent on the OTC market, amount of disclosure, and time to first public offering. For the 124 two-stage IPOs, the average (median) time from upgrade to first equity offering is approximately 17 (11) months. Hence, shares of these firms trade on average for about a year before their first public equity offerings, during which they disclose information to investors that could decrease the levels of information asymmetry at the time of the offerings.

Both two-stage IPOs and Upgrades spend, on average, more than four years (55 months and 52 months, respectively) on the OTC market before the upgrade, which could further reduce their levels of information asymmetry. Interestingly, we find that the average length of time from first disclosure, where first disclosure is the first filing of form 10-K or one of its lighter versions such as 10KSB, 10SB12B, or 10SB12G, to upgrade is longer than the average time spent on the OTC market, with two-stage IPOs initiating disclosure 65 months prior to upgrade compared to 55 months for Upgrades. Upon closer examination of firms' filing documents, we find that many of our firms voluntarily begin disclosure of information (e.g., by filing a 10-K or 10KSB) before their stocks are quoted on the OTC market. Also, almost 97% of our combined sample of two-stage IPOs and Upgrades provide at least some disclosure (in the form of an annual report) while on the OTC market.⁸

In Panel C of Table 2, we present certain IPO offering statistics for two-stage IPOs and traditional IPOs. The two groups of IPO firms differ significantly with regard to IPO proceeds,

⁷ The size of the pre-IPO market in the U.S., in terms of number of companies upgrading from the OTC to the national exchanges, is much larger than what we document in Table 1. We use the standard filters in the finance literature to identify IPOs, which may discard certain two-stage firms. We also exclude fallen angels.

⁸ There are 48 traditional IPOs that provide some disclosure prior to their IPO. Removing those from the sample does not qualitatively change the results from the analysis.

gross spread paid to underwriters, the number of shares retained during the offering (share overhang), and the presence of both reputable underwriters and VCs. Since prior studies have shown that these variables affect IPO underpricing, we include controls for each in our multivariate analysis of underpricing. When compared to two-stage IPOs, we find that traditional IPOs: exhibit significantly higher gross spreads, have higher IPO proceeds (as percentage of total assets), retain a greater percentage of their shares without distributing them to the public at the IPO, are associated with more reputable underwriters and are more frequently backed by venture capitalists.

III. Uncertainty levels at the time of first public equity offering

As already stated, we test the *lower information asymmetry hypothesis* by comparing the underpricing and post-offering stock return volatility of two-stage IPOs and traditional IPOs at the times of their first capital raising transactions in the public equity market. For a traditional IPO, this is the IPO offering date. Similarly, for a two-stage IPO, it is the first public equity offering that takes place following the upgrade to the national exchange. As our measure of underpricing, we use the first-day return, defined as the percentage change from the offer price to the closing price on day 0 (or day 1 if the price on day 0 is not available from CRSP). Following Loughran and McDonald (2013), we measure the post-offering stock return volatility by the market model root-mean square error over the period from day +5 to day +64 relative to the capital raising date. Table 3 presents the univariate results for the underpricing and the post-offering return volatility. The medians of both variables are significantly smaller (at the 1% level) for two-stage IPOs than for traditional IPOs—3.6% vs. 13.3% for underpricing and 0.035 vs. 0.043 for volatility, respectively.

We also compare the underpricing and post-offering volatility of two-stage IPOs to that of the 170 previously-withdrawn traditional IPOs. The rationale is that these firms disclose information to investors through the IPO prospectus at their first IPO filing attempt that may reduce the information uncertainty when they go public the second time. As seen from Table 3, the underpricing of these withdrawn IPOs (median of 12.1%) and their post-return volatility (median of 0.045) remain significantly higher than those of two-stage IPOs and virtually identical to the sample of traditional IPOs. We analyze the timing and the type of documents submitted to the SEC in the case of withdrawn IPOs. We find that mainly registration documents and their amendments are submitted and the average (median) intervening time period between the initial IPO withdrawal

date and the following IPO effective date amounts to 2.22 (1.35) years. Our conjecture is that both the non-disclosed reasons for the decision to withdraw from the initial IPO and the lengthy period intervening until the following IPO effective date, contribute to the significantly higher information uncertainty levels for the withdrawn IPOs when compared to two-stage IPOs.

In our multivariate analysis, we combine the two-stage IPO sample with the traditional IPO sample and regress the two measures of uncertainty on an indicator variable (*Two-stage IPO*) that is equal to one if a company is a two-stage IPO and zero if it is a traditional IPO, and a set of control variables. To account for the potentially endogenous choice of the alternative going public strategy, we use propensity-score matching for the estimation of average treatment effects and a treatment-effect model (we only present the second stage in Panel B).

The control variables we include in the treatment effect analysis are identified by prior studies (see Loughran and McDonald (2013)) as important determinants of underpricing and return volatility. We control for firm size (*Log (Sales)*), profitability (*Profitable*), the presence of reputable lead underwriters (*Reputable underwriter*), the presence of venture capital financing (*VC-backed*), the number of shares retained during the offering (*Share overhang*), and the return on the Nasdaq index in the 15 days prior to the capital raising date (*Nasdaq return*). We also add firm age (*Log(Age)*) to control for a firm's life-cycle stage at the time of going public. Additionally, we control for industry effects (based on two-digit SIC codes) and time effects, and cluster standard errors by industry and year. In unreported results, we also include indicator variables for SRMs and foreign firms, but their coefficients are not significant and their inclusion does not qualitatively affect the results.

Table 4 presents the regression results for the underpricing and the post-offering return volatility. Panel A of Table 4 presents the propensity score matching Average Treatment Effects (ATEs). We match on variables that differ significantly between two-stage IPOs and traditional IPOs, such as size, profitability, industry affiliation, year of offering, book leverage, asset tangibility, cash holdings, investments, VC financing, and the presence of a reputable underwriter. We perform all matching with replacement (i.e., the same matching firm can be used more than once as a match) because Abadie and Imbens (2006) argue that this reduces bias. The ATEs presented in Panel A of Table 4 are the core effects estimated by the propensity-score estimator, and show the average effect of using the two-stage IPO route on the level of uncertainty. The ATEs indicate that two-stage IPO firms exhibit significantly lower underpricing and post-offering

volatility than their matching firms. The difference in underpricing is approximately 22.5 percentage points, which is similar in magnitude to the 25 percentage-point difference in means shown in Table 3. When multiplied by the average amount raised for an upgraded firm (\$49 million), this indicates savings of approximately \$11 million for the average two-stage IPO. The results in Panel A of Table 4 also suggest that the two-stage IPO firms have lower post-offering volatility (difference of 0.5%, with p-value of 0.07).

Panel B of Table 4 presents the results from the treatment-effect model using the two-step estimator of Maddala (1983). In the first stage (not reported here), we estimate a probit model that is used to predict the probability of doing a two-stage IPO based upon a combined sample of our two-stage IPOs and traditional IPOs. As control variables in this model, we include the same variables that we use in the propensity-score matching: size, profitability, book leverage, cash holdings, investments, asset tangibility, VC financing, and time dummies. The model specification in the second stage, presented in Panel B, includes the predicted two-stage IPO probability estimated using in the first stage. For the underpricing model, the coefficient estimates are similar in magnitude to the propensity-score matching results in Panel A. We find that the *Two-stage IPO probability* has a negative and significant coefficient of -0.22 for both of the underpricing specification, even after controlling for the presence of reputable underwriters and VC backing. Similarly, the coefficient on the post-offer return volatility is negative and significant in Model 3, and remains so after *Reputable underwriter* and *VC-backed* are included. Among our control variables, larger and more profitable firms tend to have lower volatility and underpricing, consistent with prior studies.

Thus, the evidence in Table 4 generally supports the *lower information asymmetry* hypothesis, with stronger results for underpricing than the post-offering return volatility. It is possible, however, that two-stage IPOs have lower underpricing, but face higher gross spreads and hence similar or larger total offering costs than do traditional IPOs. For this reason, we also compare the total cost of the initial equity offering for two-stage IPO firms and traditional IPOs, which we define as the sum of the underpricing and gross spread times the amount raised. The average (median) total cost for a two-stage IPO is \$3.5 million (\$2.1 million), whereas that for traditional IPOs is \$34.2 million (\$19.2 million). Thus, taking the two-stage IPO route appears to be less expensive -- even with respect to the total offering cost.

IV. Does the first stage of the two-stage IPO process contribute to reduction in uncertainty?

In the previous section, we present evidence that two-stage IPOs have lower uncertainty levels at the time of their first public-equity offering. Because most of these firms, however, do not issue equity at the time of their upgrade, it is quite possible that the reduction in uncertainty occurs primarily after their upgrade to a national exchange. If this were the case, then the benefits of a two-stage IPO process in terms of information asymmetry reduction would be due mainly to the second stage of the process, with the first stage being of marginal importance. To shed more light on this issue, in this subsection, we study the uncertainty levels of two-stage IPOs prior to their first public offering. We first examine the uncertainty levels at the time of the upgrade to a national exchange (i.e., test of the *lower information asymmetry* hypothesis), and then investigate the effect of OTC disclosure and liquidity on the uncertainty (i.e., test of the *OTC information dissemination* hypothesis).

IV.A. Uncertainty levels of two-stage IPOs at the time of the national exchange upgrade

We perform another test of the *lower information asymmetry* hypothesis by examining the level of uncertainty surrounding two-stage IPOs at the time they get upgraded to a national exchange and comparing it to that of similar traditional IPOs. Our goal is to see whether there is a difference in uncertainty at the time of national-exchange listing, or whether the difference is present only at the time of first public-equity offering, as the results from the previous subsection indicate. Since underpricing for two-stage IPOs cannot be calculated because of the lack of offering price and the absence of an underwriting process when getting upgraded, we focus on the stock return volatility in the 60 days following the upgrade. For traditional IPOs, like in Table 3, we use the stock return volatility in the 60 days following the IPO.

In Table 5, we present the results of the post-upgrade volatility analysis for the two-stage IPOs. Panel A presents the ATE results and Panel B presents the treatment effect model. Being quoted on the OTC market by itself, however, may not automatically lower uncertainty. The *OTC information dissemination* hypothesis postulates that firms providing more information to investors will have lower uncertainty. We measure the amount of information that firms provide to investors (*Amount of disclosure*) by the total number of forms 10-K, 10-KSB, 10-Q, 10-QSB, 10SB12B, 10SB12G, 8-K, and their corresponding amendments filed by a firm while quoted on the OTC market (for traditional IPOs the variable is set to zero as these firms do not file disclosure documents prior to IPO). Additionally, we include a squared term of this disclosure variable to test

for the presence of a non-linear effect. Given the limited liquidity on the OTC market and the fact that most companies are not required to provide disclosure, it is possible that providing significant amount of disclosure in such an environment has a very different impact on valuation uncertainty than providing average or low level of disclosure.

In Panel A, the estimates of the ATEs reveal that two-stage IPO firms have significantly lower volatility than traditional IPOs at the time of their upgrade to a national exchange. When we divide the sample based on the amount of disclosure provided while on the OTC market, we find that firms with significant amount of disclosure (i.e., the ones in the top amount of disclosure quartile) have significantly lower volatility than their matching firms, while the two-stage IPOs in the lowest disclosure quartile have volatility similar to that of their matching firms.

Panel B of Table 5 presents the coefficient estimates of the treatment-effect model. Model 1 includes only our control variables and the *Two-stage IPO probability* dummy, and its coefficient is negative and statistically significant. In the other two specifications, we add the proxies for amount of information provided to investors and mandatory disclosure, and find that the coefficient on the *Two-stage IPO probability* dummy remains negative and statistically significant. However, the coefficients on *Amount of disclosure* and *Amount of disclosure*² are not statistically significant.

IV.B. Difference-in-difference analysis using an OTC market policy change

To identify the effect of the first stage of the two-stage IPO process on a firm's level of information asymmetry, we perform an additional analysis using two changes in OTC rules that occur during the period June 2009 – April 2010, and that affect the information flow of two-stage IPOs but not that of traditional IPOs. In June 2009, the OTC market introduced Real-Time+, which offers real-time pricing data to all investors at no cost. Traditional exchanges make such data available only with a 15-minute delay. In April 2010, the OTC market refined its information tiers and introduced the OTCQB tier leading the enlisted firms to higher disclosure levels that also needed to be maintained to retain their OTCQB listing status. We expect both of these events to decrease the degree of information asymmetry for OTC firms since they improve the information flow between companies and potential investors. Thus, we use them as a shock to the OTC market and perform a difference-in-difference estimation to test whether the changes are associated with lower information asymmetry for the two-stage IPOs. Following Leuz and Wisocki (2016), we do not claim causality of the identified OTC market policy changes on information asymmetry

proxies, acknowledging that measuring disclosure outcomes separately from the underlying economics is difficult. There could always exist biases in establishing a clean causal path from regulatory changes to disclosure outcomes and to economic consequences. We argue though that the recent OTC policy changes we use in our analysis offer additional convincing evidence based on the negative association of enhanced reporting and information asymmetry on the opaque OTC market.

To perform the difference-in-difference analysis, we use the sample of two-stage IPOs and their matching traditional IPOs identified in Panel A of Table 5. The dependent variable is the stock return volatility in the 60 days following the upgrade for two-stage IPOs and the stock return volatility in the 60 days following the IPO for traditional IPOs. We combine the two OTC events into one by using an indicator variable, *Post-OTC Chng*, which takes the value of one after April 2010 and zero prior to June 2009. To have a cleaner analysis, we drop the two-stage IPOs and traditional IPOs that occur between June 2009 and April 2010.⁹ In addition, we limit the sample from 2006 to 2013 to have an equal number of pre-event and post-event periods.

The results of the difference-in-difference analysis are presented in Table 6. As can be seen, the coefficient on *Two-stage IPO* is positive and significant, suggesting that the information asymmetry of two-stage IPOs was higher than that of similar traditional IPO prior to the OTC market change. The coefficient on the interaction term *Post-OTC Chng*Two-stage IPO*, which measures the effect of interest (see Angrist and Pischke (2009)), is negative and marginally significant (at the 10% level), providing some evidence that the changes in the OTC market led to lower information asymmetry for two-stage IPOs at the time they upgrade to a national exchange. Like the results in Table 5, these findings provide further support for the *OTC information dissemination* hypothesis as it appears that improvements in the informational environment of the OTC market result in lower information asymmetry levels for firms that upgrade from the OTC market to a national exchange.

IV.C. OTC market liquidity and the level of information asymmetry

Next, we investigate the effect of a firm's liquidity on the OTC market on the uncertainty level at upgrade. Since trading incorporates new information into prices, we expect more liquid stocks to be associated with lower information asymmetry levels. This analysis includes only two-stage IPOs. To measure liquidity, we use one of the measures proposed by Bruggemann et al.

⁹ When we perform the analysis including these observations, we obtain qualitatively similar results.

(2018) – the number of trading days with zero returns. The larger the number of zero-return days, the more illiquid the stock will be. We use a dummy variable, *Illiquid*, that is equal to one if a firm's number of zero-return days is in the top quartile of the distribution, and zero otherwise.

The results of the analysis are presented in Table 7. We find that more illiquid firms have significantly higher post-upgrade volatility. Similar to the results in Table 5, firms with larger amount of disclosure have lower post-upgrade volatility. The interaction term between disclosure and liquidity is not statistically significant. We also include a control variable that measures the price of the firm's stock as higher price on the OTC market (which is known for low, even penny-size stock prices) may be indicative of stronger demand for the shares of the company and thus more liquidity. Thus, the results in Tables 5, 6, and 7 suggest that the disclosure by the two-stage IPOs and the liquidity of their stock while on the OTC contributes to a significant reduction in uncertainty at the time these firms get upgraded to a national exchange.

IV.D. Time changes in uncertainty of two-stage IPOs

Although two-stage IPOs have lower uncertainty than similar traditional IPOs at upgrade, do they experience a decrease in uncertainty over time, during their stay on the OTC market? One would expect that if disclosure they provide while on the OTC market is informative. Since we do not have data on prices and returns going back to the beginning of OTC quotation, we use an alternative measure of uncertainty that does not depend on prices. We use the textual analysis-based uncertainty measures proposed by Loughran and McDonald (2011), which measures the sentiment of a firm's offering documents that are filed with the SEC. Loughran and McDonald (2011) argue that the more uncertain the text contained in the offering document (S-1 in their study), the more ambiguous are the free cash flow estimates, and thus the more difficult it is for investors to value the firm. Loughran and McDonald (2013) find that IPO firms with higher level of uncertainty in their offering documents experience higher underpricing and post-IPO stock return volatility.

Using the word lists for uncertain, negative, and modal weak words developed by Loughran and McDonald (2011), we count the number of such words in an offering document. Since some of the words in these three lists overlap, we report the results for each list separately. We also combine the counts for the three types of word lists to create a number of aggregate uncertainty words per document, which we call *Aggregate uncertainty*. *Aggregate uncertainty* is calculated as the ratio of the number of non-overlapping uncertain-, negative, and modal weak

words in the document to the total number of words in the document. For each firm, we measure the proportion of uncertain words in two types of documents. The first type is the 8-K filed at the time of the SRM, which is usually the time of first OTC market quotation. Although not an S-1, the 8-K filed at the time of the SRM (frequently called a “super” 8-K) is very detailed and looks very similar to an S-1 and unlike other 8-Ks filed to report other material company events. As already mentioned, in 2005 the SEC adopted a rule requiring the filing of an 8-K within four business days after a merger with a reporting shell company. The SEC also reviews the contents of these 8-K documents. The 8-K filing must include all the information that would be in an SEC Form 10 registration, essentially the equivalent of a public offering prospectus with some minor differences (mostly in the structure of the document, not the content). The second type of document whose fraction of uncertain words we measure is the S-1 or S-3, which are filed when a firm is about to undertake its first public-equity offering after being upgraded to a national exchange.

Panel A of Table 8 presents the analysis of how the fraction of uncertain, negative, modal weak and aggregate uncertainty words in a filing document (8-K and S-1 or S-3) changes from the SRM date until the first equity offering on the national exchange. The median percentage of aggregate uncertain words goes down from 3.15% at the time of SRM to 2.27% at the time of first equity offering.¹⁰ We use two tests for equality of medians – the Wilcoxon rank-sum test and the Wilcoxon signed-rank test – to ascertain whether there is a significant change in the tone of the offering documents. Both test results indicate that the uncertainty of the offering documents decreases significantly between the time of first OTC market quotation and the time of first equity offering after the upgrade to a national exchange. We obtain similar results when examining the changes in each word list separately. As Panel A of Table 8 suggests, both the fraction of negative and modal weak words decrease significantly from the time of first OTC market quotation and the time of first equity offering, while we do not find significant changes in the fraction of uncertain words. These findings are consistent with our findings in the prior subsections that suggest that lower degree of information asymmetry is one of the potential benefits for doing a two-stage IPO.

Next, we do an additional check of whether the annual reports filed by two-stage IPOs over time reduce uncertainty using textual analysis. We use cosine similarity analysis (see Hoberg and Lewis (2017)) of the MD&A section of the first and last annual report filed while on the OTC

¹⁰ These numbers are similar to those in Loughran and McDonald (2011), who in their Table II report an average of 3.02% and a median 2.95% with regards to the fraction of uncertain words in the 10-K statements.

market. The cosine similarity analysis relies on word usage distributions to tests how similar two documents are. The closer the cosine similarity is to zero, the more dispersed the word content of the two documents and hence the more informative they are. We compare the cosine similarity between the MD&A section of the first and last annual report filed while on the OTC market to the average cosine similarity between any two consecutive documents in our sample.

The results are presented Panel B of Table 8. Both the average and median cosine similarity between the MD&A section of the first and last annual report filed while on the OTC market are smaller than the average and median cosine similarity of any two consecutive documents. Tests for equality of medians show that the differences in the medians are statistically significant. Thus, the results suggest that the filings by two-stage IPOs are informative. Combined with the results in Panel A of Table 7, this suggests that disclosure on the OTC market does indeed reduce information asymmetry levels for two-stage IPOs.

V. Conclusion

In this study, we examine a new way of accessing the main U.S. capital markets, namely through exchange upgrades. We analyze the benefits of doing a traditional IPO vs. those of a two-stage IPO – where a firm first gets quoted on the OTC market and then graduates to a national exchange such as NYSE, NASDAQ, or AMEX where it makes its first public equity offering. We first test whether such a two-stage IPO process leads to a lower level of uncertainty at the time of the upgrade to a national exchange and at the time of first public equity offering following that upgrade. We then also test whether the potential reduction of valuation uncertainty due to the pre-IPO trading and disclosure on the OTC market results in lower underpricing and stock return volatility at the time of first public equity offering as well as at the time of graduation to a national exchange as compared to a control sample of similar companies that pursue a traditional IPO. Due to the extensive trading and disclosure during the OTC quotation, we are able to test the contribution of the OTC market (first stage) in lowering information asymmetry and the cost of capital.

Our findings support the argument for a direct benefit in the form of reduced information-asymmetry levels from going public via the two-stage mechanism. We document that a two-stage IPO firm experiences significantly lower underpricing than does a similar traditional IPO firm when it undertakes its first public equity offering following the upgrade to a national exchange.

We also find that a two-stage IPO firm experiences lower stock-return volatility – both after the upgrade on a national exchange and after their first public equity offering. Our analysis shows that a company choosing the alternative IPO route experiences a significant decrease in uncertainty from the time of initial quotation on the OTC market until its first public-equity offering. The results are robust to various approaches to controlling for the endogeneity of the two-stage IPO choice – propensity score matching ATEs, a treatment effect model, and a difference in difference approach that uses a novel OTC market policy change to show the direction of the impact of disclosure on informational asymmetry. We conclude that pre-IPO trading and the accompanying disclosure – even in a low-visibility environment such as the OTC market – leads to reduction of uncertainty and corresponding lower underpricing and lower levels of volatility at the time of initial public-equity offering on a national exchange.

Lastly, our study has policy implications. Our results indicate that a sub-sample of young firms may derive certain benefits, such as lower IPO underpricing and post-offering return volatility, from the disclosure and quoting on the OTC markets. The results are especially relevant for the Main Street Growth Act (passed the House Financial Services Committee on March 2, 2016), which seeks to introduce venture exchanges where small firms could raise capital to finance their growth. Our findings offer some evidence on how the OTC markets can benefit small firms and under certain conditions (quoted on the upper tiers) serve as a stepping stone platform for firms to get upgraded to the main U.S. stock exchanges.

Appendix A

Variables' definitions

Variable	Definition
<i>Disclosure-related variables</i>	
Amount of disclosure	Total number of forms 10-K, 10-KSB, 10-Q, 10-QSB, 10SB12B, 10SB12G, 8-K, and their corresponding amendments filed by a firm while listed on the OTC market (Upgrades or Two-stage IPOs). The variable is set to zero when referring to traditional IPOs.
Cosine similarity	Cosine similarity, calculated using the approach in Hoberg and Lewis (2017), between word distribution vectors for the MD&A section of different annual reports
Uncertainty	Uncertainty of offering document is measured by the fraction of words in the offering document that are classified as negative, uncertain, or weak modal according to the sentiment word lists of Loughran and McDonald (2011).
<i>Financials-related variables</i>	
Advertising expenses assets ratio	Ratio of advertising expenses over contemporaneous total assets
CAPEX ratio	Ratio of net capital expenditures over contemporaneous total assets
Cash burn rate	The absolute value of the ratio of operating income before depreciation over the sum of cash and cash equivalents; When the income number is positive, cash burn is set equal to zero; This follows Chaplinsky and Haushalter (2010)
Cash ratio	Ratio of cash holdings over contemporaneous total assets
Firm age	The age of the firm
Intangible assets ratio	Ratio of intangible assets over contemporaneous total assets
Inventories assets ratio	Ratio of inventories over contemporaneous total assets
Investments ratio	Ratio of capital expenditures and research and development expenditures over total assets
Log(Sales)	Natural logarithm of Total sales/turnover
Missing R&D dummy	Dummy variable equal to 1 if R&D is missing, and 0 otherwise
MTB	Ratio of market equity, total debt, preferred stock liquidating value minus deferred taxes and investment tax credits over total assets
Profitability	Ratio of operating income before depreciation and amortization over total assets
Profitable	Dummy variable equal to 1 if profitability is greater than 0, and 0 otherwise
R&D ratio	Ratio of research and development expenses over contemporaneous total assets

Receivables assets ratio	Ratio of accounts receivables over contemporaneous total assets
Sales	Total sales/turnover
Net PPE assets ratio	Ratio of net property plant and equipment over contemporaneous total assets
Tangible assets	Tangible assets
Total assets	Book value of total assets
Total book leverage ratio	Ratio of short-term debt and long-term debt over total assets
Working capital assets ratio	Ratio of current assets minus current liabilities over contemporaneous total assets
<i>Upgrade-related variables</i>	
Time from first disclosure until upgrade	Time intervening between the date of the first SEC disclosure until the upgrade date
Time on the OTC market	Time spent on the OTC market
Time to first public equity offering	Time intervening the upgrade date to a national exchange to the first public equity offering date
Time since first disclosure	Time intervening the first disclosure date until the upgrade date
Post-OTC Chng	Dummy variable equal to 1 after April 2010, and 0 prior to June 2009
Upgraded	Dummy variable that takes the value of 1 if firm got upgraded to the national stock exchanges from the OTC market (two-stage IPOs, upgrades), and 0 otherwise (traditional IPOs)
<i>Financing-related variables</i>	
Number of private offerings	Number of private offerings closed by the same issuer during the time period of 2001 to 2015
Private offering gross proceeds market cap ratio	Ratio of the total gross proceeds amount raised through the private offering over the issuer's market capitalization at closing
Private offering discount	Computed only for closed placements. Indicates the percentage of the stock price calculated/reported on the date prior to the best available of: a) date of definitive agreement/pricing, b) date of offering announcement and c) date of closing. Discount (premium) values are presented with a positive (negative) sign
<i>IPO-related variables</i>	
Gross spread (\$ per share or bond)	Total manager's fee, expressed in dollars per share or bond. The fee is shared among lead managers, co-managers, and syndicate group. Includes management fee, underwriting fee, and selling concession.
IPO proceeds / Total assets	IPO proceeds divided by total assets in year -1
Reputable underwriter	Dummy variable that takes the value of 1 if firm f the lead underwriter's Carter-Manaster (1990) rank is greater than 8, and 0 otherwise
Share overhang	The number of shares retained divided by the number of shares in the initial offering
Underpricing	The difference between first-day closing price and the

VC-backed	offer price divided by the offer price Dummy variable that takes the value of 1 if IPO is VC-backed, and 0 otherwise
<i>Returns-related variables</i>	
Illiquidity	A dummy variable equal to one if for a given firm the fraction of days with zero returns to total trading days in the three months prior to upgrade is in the top quartile of the distribution, and zero otherwise
Nasdaq return	Buy-and-hold return of the CRSP Nasdaq value-weighted index for the 15-trading days prior to the offering date, ending on day t-1
Post-offering return volatility	The market model root-mean square error for each firm over day +5 to day +64 relative to the offer day
Price	The average price on the OTC market in the three months prior to upgrade

ACCEPTED MANUSCRIPT

References

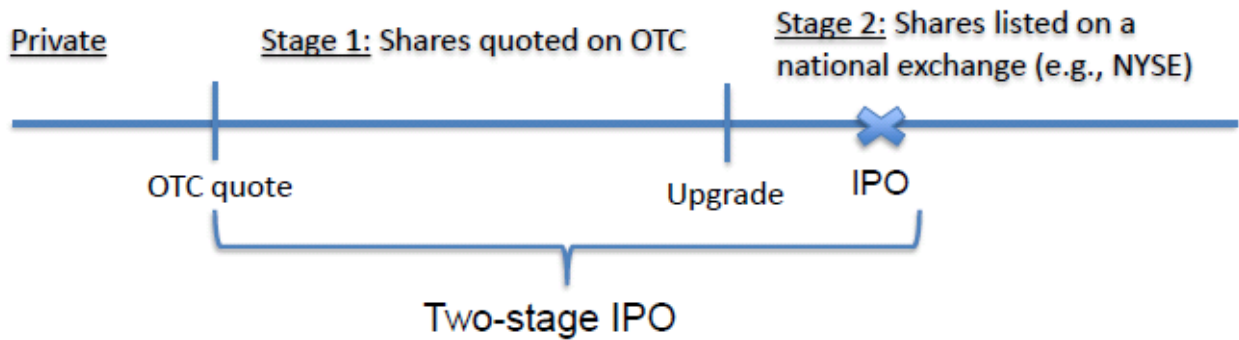
- Abadie, A., Imbens, G., 2006. Large sample properties of matching estimators for average treatment effects. *Econometrica* 74, 235-267.
- Angrist, J., Pischke, S., 2009. *Mostly Harmless Econometrics: An Empiricist's Companion*. Princeton University Press, Princeton New Jersey.
- Benveniste, L., Spindt, P., 1989. How investment bankers determine the offer price and allocation of new issues. *J. Financial Econ.* 24, 343-362.
- Bruggemann, U., Kaul, A., Leuz, C., Werner, I., 2018. The twilight zone: OTC regulatory regimes and market quality. *Rev. Financial Stud.* 31, 898-942.
- Brooks, R., Mathew, P., Yang, J., 2014. When-issued trading in the Indian IPO market. *J. Financ. Markets* 19, 170-196.
- Bushee, B., Leuz, C. 2005. Economic consequences of SEC disclosure regulation: Evidence from the OTC Bulletin Board. *J. Account. Econ.* 39, 233-264.
- Chang, C., Chiang, Y., Qian, Y., Ritter, J., 2017. Pre-market trading and IPO pricing. *Rev. Financial Stud.* 30, 835-865.
- Chaplinsky, S., Haushalter, D., 2010. Financing under extreme risk: Contract terms and returns to private investments in public equity, *Rev. Financial Stud.* 23, 2789-2820.
- Derrien, F., Kecskés, A., 2007. The initial public offerings of listed firms. *J. Finance* 62, 447-479.
- Dunbar, C., Foerster, S., 2008. Second time lucky? Withdrawn IPOs that return to the market. *J. Financial Econ.* 87, 610-635.
- Hoberg, G., Lewis, C., 2017. Do fraudulent firms produce abnormal disclosure? *J. Corporate Finan.* 43, 58-85.
- Jiang, J., Petroni, K., Wang, I., 2016. Private intermediary innovation and market liquidity: Evidence from the pink sheets market. *Contemp. Account. Res.* 33, 920-948.
- Leland, H., Pyle, D., 1977. Informational asymmetries, financial structure, and financial intermediation, *J. Finance* 32, 371-387.
- Leuz, C., Wysocki, P., 2016. The economics of disclosure and financial reporting regulation: Evidence and suggestions for future research, *J. Account. Res.* 54, 525-622.
- Loffler, G., Panther, P., Theissen, E., 2005. Who knows what when? The information content of pre-IPO market prices. *J. Financial Intermed.* 14, 466-484.

- Loughran, T., McDonald, B., 2011. When is a liability not a liability? Textual analysis, dictionaries, and 10-Ks. *J. Finance* 66, 35–65.
- Loughran, T., McDonald, B., 2013. IPO first-day returns, offer price revisions, volatility, and S-1 language. *J. Financial Econ.* 109, 307-326.
- Maddala, G., 1983. Limited-dependent and qualitative variables in econometrics. Cambridge University Press, Cambridge Massachusetts.
- Myers, S., Majluf, N., 1984. Corporate financing and investment decisions when firms have information that investors do not have, *J. Financial Econ.* 13, 187-221.
- Ritter, J., Welch, I., 2002. A review of IPO activity, pricing, and allocations. *J. Finance* 57, 1795–1828.
- Rock, K., 1986. Why new issues are underpriced. *J. Financial Econ.* 15, 187–212.
- Schrand, C., Verrecchia, R., 2005. Information disclosure and adverse selection explanations for IPO underpricing, University of Pennsylvania, working paper.
- Silchenko, V., 2015. So you think you can go public: (Re)Meet the OTC, The Huffington Post blog – 5/26/2015.
- White, J., 2016, Outcomes of investing in OTC stocks. Division of Economic and Risk Analysis, U.S. Securities and Exchange Commission, white paper.

Figure 1

The two-stage IPO process vs. the traditional IPO process

Figure 1a describes the two-stage IPO process, and Figure 1b describes the traditional IPO process. OTC market quote is the first date of share quotation on the OTC market. All two-stage IPOs are private firms prior to the OTC market quotation. IPO is the IPO offer date. The scale of each line in the Figure 1 is not indicative of the length of the process, but rather is there to explain the mechanism followed in traditional IPOs and two-stage IPOs, respectively.

Figure 1a. The two-stage IPO process**Figure 1b. Traditional IPO process**

ACCEPTED

Table 1
Sample selection

The table describes the filters we use to construct our sample of Two-stage IPOs and Upgrades. Two-stage IPOs are firms that first get quoted on the OTC market, then get upgraded to a national exchange (NYSE, Nasdaq, or Amex) and issue public equity for the first time in their history within five years after the upgrade to the national exchange. Upgrades are firms that first get quoted on the OTC market, then get upgraded to a national exchange and do not issue public equity after their upgrades. Data on CERTAMX, CERTNASD or CERTNYS filings for the period 1996-2013 is obtained from SEC's Edgar system.

Number of firms with forms CERTAMX, CERTNASD or CERTNYS during 1996-2013	6,687
Less: Firms that could not be matched to Compustat data	-1,194
Less: Firms that could not be matched to CRSP data	-620
Less: Firms with non-equity CERTAMX, CERTNASD or CERTNYS filings	-796
Less: Firms that are already public or are cross-listed	-1,748
Less: Traditional IPOs	-1,447
Equals: Firms upgrading from OTC to NYSE, NASDAQ, and AMEX that also have data on CRSP and Compustat	
Less: Financial firms (SIC between 6000 and 6999)	-371
Less: Utilities (SIC between 4900 and 4999)	-49
Equals: Non-financial and non-utilities firms upgrading from OTC to NYSE, NASDAQ, and AMEX that also have data on CRSP and Compustat	462
Less: Firms that had an IPO before going to the OTC	-131
Less: Firms whose public equity offerings came more than five years after the upgrade to a national exchange	-24
Equals: Two-stage IPOs and Upgrades	307
Of which two-stage IPOs	124
Of which Upgrades	183

Table 2

Summary statistics

This table (all panels) provides summary statistics for our sample that consists of 307 firms that get upgraded from the OTC market to a national exchange and 1,903 traditional IPOs for the period 1996-2013. One hundred and twenty-four of the upgrades do an equity offering following the upgrade (*Two-stage IPOs*); the other 183 do not issue public equity following the upgrade (*Upgrades*). Panel A reports the number of observations and the average underpricing and post-offering volatility for each calendar year. Panel B presents offering and disclosure characteristics in two-stage IPOs and traditional IPOs. Panel C presents IPO characteristics in two-stage IPOs and traditional IPOs. All variables are defined in Appendix A. The symbols ***, **, * represent statistically significant differences between the combined sample of two-stage IPOs and Upgrades and the sample of traditional IPOs, and between the subsamples of two-stage IPOs and Upgrades, at the 1 percent, 5 percent, and 10 percent based on nonparametric Mann-Whitney test for equality of medians.

Panel A. Annual distribution of two-stage IPOs, Upgrades, and traditional IPOs

Year	Two-stage IPOs			Traditional IPOs			Upgrades
	Num. Obs.	Underpricing	Post-offering volatility	Num. Obs.	Underpricing	Post-offering volatility	Num. Obs.
1996	0	-		281	18.8%	0.043	1
1997	1	-2.0%	0.036	271	16.3%	0.041	4
1998	0	-		150	22.8%	0.050	7
1999	3	3.7%	0.047	264	76.9%	0.071	2
2000	0	-		210	62.4%	0.081	22
2001	0	-		30	18.9%	0.053	3
2002	0	-		34	9.9%	0.040	4
2003	3	7.7%	0.027	26	12.2%	0.036	6
2004	4	6.8%	0.046	96	13.3%	0.036	14
2005	8	1.6%	0.030	65	16.4%	0.033	14
2006	7	6.0%	0.024	88	11.2%	0.031	12
2007	21	10.5%	0.041	110	14.0%	0.037	27
2008	12	15.3%	0.053	11	6.6%	0.043	12
2009	26	5.7%	0.041	18	12.9%	0.032	9
2010	15	1.1%	0.040	56	10.9%	0.034	21
2011	7	-1.1%	0.047	51	15.7%	0.039	6
2012	8	10.8%	0.038	51	17.0%	0.038	6
2013	9	2.9%	0.033	91	20.6%	0.040	13
Full Sample	124	4.9%	0.040	1,903	30.5%	0.049	183

Panel B. Offerings and disclosure summary statistics for the two-stage IPOs and Upgrades

Variable	Mean	Median	Number of companies
<i>Two-stage IPOs</i>			
Time to first public equity offering (months)	17 mo.	11 mo.	124
Time on the OTC market (months)	55 mo.	42 mo.	118
Time from first disclosure until upgrade (months)	65 mo.	55 mo.	124
Amount of disclosure while on the OTC market (number of documents)	51	39	124
<i>Upgrades</i>			
Time on the OTC market (months)	52 mo.	39 mo.	178
Time from first disclosure until upgrade (months)	55 mo.	39 mo.	183
Amount of disclosure while on the OTC market (number of documents)	47	35	183

Panel C. IPO statistics for two-stage IPOs and traditional IPOs

Variables	Traditional IPOs (N=1,903)			Two-stage IPOs (N=124)	
	Mean	Median		Mean	Median
IPO proceeds / Total assets	0.69	0.61	***	0.42	0.30
Gross spread	7.1	7.0	***	6.0	6.0
Share overhang	3.4	2.8	***	2.1	2.0
Reputable underwriter	0.7	1.0	***	0.2	0.0
VC-backed	0.6	1.0	***	0.2	0.0
Firm age	10.8	6.0	***	11.6	9.0
Nasdaq return	-0.1%	0.1%		0.1%	0.1%

Table 3

Underpricing and volatility of two-stage IPOs and traditional IPOs

This table presents the univariate results for underpricing and post-offer return volatility for the sample of 124 two-stage IPOs and 1,903 traditional IPO firms. Withdrawn traditional IPOs (170 firms) are firms that initially file for an IPO, then their IPO gets withdrawn, and eventually go public after a few years. All variables are defined in Appendix A. The p-values are based on nonparametric Mann-Whitney test for equality of medians.

	Number of obs.	Underpricing		Post-offering return volatility	
		Mean	Median	Mean	Median
Two-stage IPOs	124	4.9%	3.6%	0.040	0.035
Traditional IPOs	1,903	30.5%	13.3%	0.049	0.043
<u>Wilcoxon rank-sum test for Median_{Two-stage IPO} = Median_{Traditional IPO}</u>					
		Z = -6.86		Z = -5.64	
		Prob > Z = 0.01		Prob > Z = 0.01	
Traditional IPOs that were initially withdrawn	170	29.5%	12.1%	0.050	0.045
<u>Wilcoxon rank-sum test for Median_{Two-stage IPO} = Median_{Traditional IPO}</u>					
		Z = -4.12		Z = -3.47	
		Prob > Z = 0.01		Prob > Z = 0.01	

Table 4

Uncertainty at the time of first public equity offering – Two-stage IPOs

This table presents the results of the analysis of underpricing and post-offering return volatility at the time of the first public equity offering. Panel A presents the ATEs between the underpricing and return volatility of two-stage IPO firms and that of a control sample of traditional IPO firms selected based on propensity score matching. Panel B presents the second stage results of a treatment effects model (Maddala (1983)). All variables are defined in Appendix A. The symbols ***, **, * represent statistical significance at the 1 percent, 5 percent, and 10 percent, respectively.

Panel A. Propensity score matching (Average treatment effects)

Variable of interest	Difference (Std Err)	p-value (difference=0)
Underpricing _{Two-stage IPO} – Underpricing _{Traditional IPO}	-0.225 (0.025)	0.01
Return volat _{Two-stage IPO} – Return volat _{Traditional IPO}	-0.005 (0.0027)	0.07

Panel B. Treatment effects model

Dependent variable:	Underpricing		Post-offering return volatility	
	(1)	(2)	(3)	(4)
Two-stage IPO probability	-0.231** (-2.53)	-0.220*** (-3.19)	-0.014*** (-4.51)	-0.013*** (-4.30)
Log(Sales _{t-1})	-0.006 (-0.23)	-0.002 (-0.17)	-0.001*** (-4.60)	-0.001*** (-4.41)
Profitable _{t-1}	-0.094*** (-3.54)	-0.1512*** (-6.11)	-0.011*** (-8.51)	-0.010*** (-8.57)
Log(Firm age _{t-1})	-0.059*** (-3.76)	-0.071*** (-4.35)	-0.003*** (-4.40)	-0.003*** (-4.40)
Share overhang	0.010 (0.55)	0.024 (1.27)	0.001 (1.04)	0.001 (1.18)
Reputable underwriter		0.136*** (5.23)		-0.001 (-0.43)
VC-backed		0.056** (2.07)		0.002 (1.41)
Nasdaq return	0.010 (0.55)	0.024 (1.27)	-0.034 (-1.04)	-0.034 (-1.11)
Industry indicators	Yes	Yes	Yes	Yes
Time indicators	Yes	Yes	Yes	Yes
Num. Obs.	2,027	2,027	2,027	2,027
Prob $\chi > 0$	0.00	0.00	0.00	0.00

Table 5

Uncertainty at the time of upgrade – Two-stage IPOs

This table presents the results of the analysis of post-IPO return volatility at the time of upgrade to a national exchange for the subsample of two-stage IPO firms. Panel A presents the ATEs between the underpricing and return volatility of upgraded firms and that of a control sample of IPO firms selected based on propensity score matching. Panel B presents the second stage results of a treatment effects model (Maddala (1983)). Robust *t*-statistics in parenthesis. All variables are defined in Appendix A. The symbols ***, **, * represent statistical significance at the 1 percent, 5 percent, and 10 percent, respectively.

Panel A. Propensity score matching (Average treatment effects)

<i>Variable of interest</i>	<i>Num. obs.</i>	<i>Difference (Std Err)</i>	<i>p-value (difference=0)</i>
<u>Average treatment effect – Full sample</u>			
Return volat _{Two-stage IPO} – Return volat _{Traditional IPO}	124	-0.006 (0.002)	0.01
<u>Average treatment effect – firms in top quartile of disclosure</u>			
Return volat _{Two-stage IPO} – Return volat _{Traditional IPO}	30	-0.012 (0.004)	0.01
<u>Average treatment effect – firms in lowest quartile of disclosure</u>			
Return volat _{Two-stage IPO} – Return volat _{Traditional IPO}	30	-0.006 (0.007)	0.39

Panel B. Treatment effects model

<i>Dependent variable:</i>	<i>Post-offering return volatility</i>		
	<i>(1)</i>	<i>(2)</i>	<i>(3)</i>
Upgraded probability	-0.013*** (-4.19)	-0.015*** (-3.04)	-0.016*** (-3.22)
Amount of disclosure		0.0003 (0.38)	0.0003 (0.30)
Amount of disclosure ²		-0.0004 (-0.81)	-0.0004 (-0.73)
Log(Sales _{t-1})	-0.001*** (-6.08)	-0.001*** (-6.05)	-0.003*** (-9.13)
Profitable _{t-1}	-0.012*** (-9.90)	-0.012*** (-9.88)	-0.012*** (-11.23)
Log(Firm age _{t-1})	-0.003*** (-4.70)	-0.003*** (-4.67)	-0.003*** (-4.62)
Nasdaq return	-0.023 (-0.77)	-0.020 (-0.69)	-0.019 (-0.66)
Industry indicators	Yes	Yes	Yes
Time indicators	Yes	Yes	Yes
Num. Obs.	2,027	2,027	2,027
Prob $\chi > 0$	0.00	0.00	0.00

Table 6

Uncertainty of two-stage IPOs at the time of upgrade – Difference-in-difference analysis

This table presents results from a difference-in-difference estimation using two regulatory changes that occurred on the OTC market during the period June 2009 – April 2010. In June 2009, the OTC market introduced Real-Time+, which offers real-time pricing data to all investors at no cost. In April 2010, the OTC market refined its information tiers and introduced the OTCQB category. We compare the uncertainty of two-stage IPOs to that of a control sample of matching firms from Table 4. We limit the analysis from year 2006 until 2013 to have periods of equal length before and after the event. Robust t-statistics in parenthesis. All variables are defined in Appendix A. The symbols ***, **, * represent statistical significance at the 1 percent, 5 percent, and 10 percent, respectively.

Dependent variable:	Post-offering return volatility	
	(1)	(2)
Two-stage IPO	0.018*** (4.60)	0.017*** (3.53)
Post-OTC Chng	0.002 (0.43)	0.007 (1.50)
Two-stage IPO * Post-OTC Chng	-0.010* (-1.77)	-0.018** (-2.52)
Log(Sales _{t-1})		-0.001 (-1.51)
Profitable _{t-1}		0.001 (0.39)
Log(Age _{t-1})		0.001 (0.50)
Nasdaq return		-0.117 (-0.81)
Industry indicators	No	Yes
Num. Obs.	156	156
Adjusted R ²	15.6%	39.8%

Table 7

Uncertainty of two-stage IPOs at the time of upgrade – Effect of OTC disclosure and trading

This table presents results from an OLS regression on the sample of two-stage IPOs only. *Illiquidity* is a dummy variable equal to one if for a given firm the fraction of days with zero returns to total trading days in the three months prior to upgrade is in the top quartile of the distribution, and zero otherwise. Robust t-statistics in parenthesis. All variables are defined in Appendix A. The symbols ***, **, * represent statistical significance at the 1 percent, 5 percent, and 10 percent, respectively.

Dependent variable:	Post-upgrade return volatility	
	(1)	(2)
Amount of disclosure	-0.0001** (2.11)	-0.0001** (-2.16)
Illiquidity	0.021** (2.24)	0.022** (2.23)
Disclosure * Illiquidity		-0.002 (-1.48)
Price		-0.007 (-1.18)
Log(Sales _{t-1})	-0.0002 (-0.24)	-0.0001 (-0.08)
Profitable _{t-1}	0.001 (0.16)	0.002 (0.21)
Log(Age _{t-1})	0.005 (1.56)	0.004 (1.22)
Nasdaq return	-0.078 (-0.40)	-0.064 (-0.36)
Industry indicators	No	Yes
Num. Obs.	65	65
Adjusted R ²	60.6%	62.8%

Table 8

Changes in uncertainty from time of OTC market listing to first public equity offering on a national exchange

This table presents the results for the change in uncertainty of offering documents from the time of OTC listing to the time of first public equity offering. Panel A presents the results for the change in uncertainty of offering documents from the time of OTC listing to the time of first public equity offering. The sample consists of 54 two-stage IPOs that get quoted on the OTC market as a result of a shell reverse merger over the period 2005-2013. The offering document at the time of OTC listing is an 8-K, and at the time of first public equity offering is an S-1. Panel B lists the average and median cosine similarity (using the approach in Hoberg and Lewis (2017)) estimate for the first and last annual reports for two-stage IPOs while on the OTC market. Those are compared to the average and median cosine similarity of any two consecutive annual reports in the sample. All variables are defined in Appendix A.

Panel A. Changes in uncertainty of offering documents from the time of OTC listing to the time of first public equity offering

	Number of obs.	Mean	Median	Wilcoxon Rank-sum	<u>Wilcoxon signed-rank</u>
% Aggregate Uncertainty OTC listing	54	3.10%	3.15%		
% Aggregate Uncertainty First equity offering	54	2.95%	2.27%	0.05	0.05
% Uncertain words OTC listing	54	1.54%	1.56%		
% Uncertain words First equity offering	54	1.56%	1.53%	0.88	0.74
% Negative words OTC listing	54	1.59%	1.57%		
% Negative words First equity offering	54	1.33%	1.26%	0.01	0.01
% Weak modal words OTC listing	54	1.04%	0.91%		
% Weak modal words First equity offering	54	0.89%	0.88%	0.05	0.05

Wilcoxon rank-sum test for Median_{OTC listing} = Median_{First equity offering}

Z = 1.96

Prob > |Z| = 0.05

Wilcoxon signed-rank test for Median_{OTC listing} = Median_{First equity offering}

Z = 2.10

Prob > |Z| = 0.05

Panel B. Cosine similarity between the MD&A sections of the first and last annual report while on OTC

	Mean	Median	Num. obs.
Cosine similarity: last vs first 10-K	0.33	0.25	78
Cosine similarity: any two consecutive 10-Ks	0.63	0.65	271
Wilcoxon test for equality of medians:		-7.78 (0.01)	