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

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Abstract: We examine the effects on IPO uncertainty of an alternative going-public mechanism – the "two-stage IPO." In a two-stage IPO, a firm first gets quoted on the OTC market, and then upgrades to a national exchange where its initial public equity offering takes place. We find that a firm pursuing a two-stage IPO experiences lower underpricing and lower stock-return volatility than does a similar firm pursuing a traditional IPO. We also find that uncertainty decreases significantly from the time of first OTC market quotation until the time of upgrade to a national exchange. We show suggestive evidence that a two-stage IPO with greater disclosure during the first stage experiences greater reduction in uncertainty.

Keywords: Initial Public Offering, Two-stage IPO, Exchange upgrade, Underpricing, Information asymmetry, Stock volatility

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I. Introduction

In this study, we identify and analyze an alternative way of going public that has gained popularity in the last decade – the two-stage initial public offering (IPO) – and examine its effects on the level of information asymmetry at the time of a firm's IPO as measured by IPO underpricing and post-offering return volatility. When a company is about to go public, there usually is significant uncertainty regarding its valuation and prospects. This uncertainty, combined with the presence of differentially informed investors, results in underpricing at the time of the IPO.[1] IPO underpricing, which has been a persistent phenomenon both over time and across countries, imposes opportunity costs on a company that is going public because it reduces the amount of money it raises at the time of the offering. Our main goal is to assess how pre-IPO trading in the U.S. over-the-counter (OTC) market affects the level of IPO uncertainty.

Figure 1 compares the two-stage IPO process to the traditional IPO process.[2] 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 like NYSE or NASDAQ (stage two). There is no underwriter participation at the time of upgrade. The firm's first public-equity offering occurs at the second stage of the process, concurrently with or following the exchange upgrade. We hypothesize that the pre-IPO trading and dissemination of information about the firm occurring during the first stage of the process leads to some resolution of valuation uncertainty; and that this, in turn, should result in lower underpricing in a two-stage IPO than in a traditional IPO. The OTC market, however, has some important limitations, such as low liquidity, high volatility, lack of analyst following, and high fraud levels, that allow uncertainty to remain high, even for a two-

[1] See Rock (1986), Benveniste and Spindt (1989), and Welch (1992), among others, for more detailed explanation of the relationship between asymmetric information and differentially informed investors and IPO underpricing.

[2] The scale of each line in Figure 1 is not indicative of the lengthiness of the process, but rather is there to explain the mechanism followed in traditional IPOs and two-stage IPOs, respectively.

stage IPO. Thus, the extent to which a two-stage IPO reduces valuation uncertainty, if at all, is an empirical question.

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 three measures of uncertainty: (1) the degree of underpricing at the time of IPO, (2) the 60-day post-IPO stock return volatility, as well as (3) the tone of a company's offering documents. Our sample of two-stage IPOs consists of 124 firms that, during the period 1996-2013, first get quoted on the U.S. OTC market and then get upgraded to NASDAQ, NYSE, or AMEX where they undertake their first public-equity issuance, concurrently with or following the upgrade. We compare these firms to a sample of 1,903 traditional IPOs that go public during the same time period of 1996-2013. For some of our analysis, we also use a non-overlapping sample of 183 firms that get upgraded from the OTC market to a national exchange, but do not issue new equity. We use propensity-score matching and a treatments-effects model to control for the possibility that firms self-select into the two-stage IPO process.

Compared to a similar firm that does a traditional IPO, we find that a firm pursuing a two-stage IPO experiences significantly lower underpricing at its 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 firms that do traditional IPOs. Likewise, we find that a two-stage IPO firms has lower post-offering volatility than does a traditional IPO firm, although the effect of a two-stage IPO on volatility is not as strong as its effect on underpricing. We also find that a two-stage IPO has a lower total cost of its equity offering than does a traditional IPO. Our results are robust to controlling for the potentially endogenous nature of the two-stage IPOs.

Next, we try to 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 in the months following the upgrade. Registering with the U.S. Securities and Exchange Commission (SEC) and regularly disclosing information to investors is mandatory for each two-stage IPO following its upgrade to a national exchange; these mandatory disclosures prior to the IPO should reduce information uncertainty. For a traditional IPO, such 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 (as measured by stock return volatility during the two months following the upgrade to a national exchange rather than during the two months following issuance of new equity) to that of similar traditional IPOs in order to see whether the first stage of the two-stage IPO process plays a role in the reduction of uncertainty. We find that the first-stage trading 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 traditional IPOs. This is consistent with dissemination of information during OTC market trading that leads to lower stock volatility when trading commences after the upgrade. We document similar results for the sample of upgraded firms that do not undertake a first public equity offering. We also find that two-stage IPO firms providing more significant disclosures to investors while being quoted on the OTC market experience greater reductions in uncertainty.

Further, we study the change in the degree of information asymmetry from the time between an initial OTC market quotation and the IPO on a national exchange. Because of data

availability, this analysis is limited to two-stage IPO firms that initially list on the OTC market via a shell reverse merger (SRM). 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 two-stage IPO firms, the degree of uncertainty decreases significantly from the time of OTC market listing to the time of first equity offering on a national exchange. This finding further illustrates the benefits of doing a two-stage IPO in terms of resolving valuation uncertainty. To the best of our knowledge, our study is the first to conduct textual analysis on SEC documents of OTC market-traded stocks.

Our study makes contributions to various strands of the IPO literature. First, 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, are based on the traditional IPO mechanism. Our results suggest that a two-stage IPO significantly reduces underpricing and volatility. We know of no existing study using U.S. data that analyzes the levels of underpricing when issuers have pre-IPO trading and disclosure.[3] Bruggemann *et al*. (2013) is the only study to document the existence of "rising stars": firms traded on the OTC market that are able to upgrade to national stock exchanges. They argue that less than 9% of new firms not being listed on any other exchange are able to upgrade, but do not study these firms after their upgrade.

Second, our study contributes to the new and growing literature on pre-IPO trading and its effects on firm uncertainty, underpricing, and the general usefulness of pre-IPO markets for price discovery. Cornelli, Goldreich and Ljungqvist (2006) use the when-issued market

[3] In August 2007, the OTC market (at that point, Pink Sheets LLC) introduced a tier system to differentiate financial and corporate disclosure with the goal being that the upper tiers OTCQB and OTCQX become liquid venture marketplaces and the stepping stones to national exchanges, in case firms desire to upgrade. For more information on the new tier system, see Jiang, Petroni and Wang (2015), Bruggemann et al. (2013) as well as www.otcmarkets.com.

(preceding European IPOs) to test whether there is an association between the small investors' sentiment in the pre-IPO market and the post-IPO prices. They find that small investors overpay when they are overoptimistic, and are priced out of the market when they are pessimistic. The study closest to ours is Derrien and Kecskes (2007), which analyzes U.K. firms that first list without issuing equity and then issue equity thereafter. Like our study, Derrien and Kecskes (2007) find that such a two-stage offering results in lower underpricing. While Derrien and Kecskes (2007) focus on a single market (the London Alternative Investment Market (AIM)), which is a traditional IPO mechanism that does not provide the choice for an exchange upgrade, we add important evidence to their work by examining an alternative two-stage mechanism, which involves OTC market pre-IPO trading, which may or may not involve disclosure to investors, and a subsequent listing on main U.S. stock exchanges that takes place with no underwriting trading on a lower visibility market, to compare information asymmetry levels between two listing mechanisms, and to examine the contribution of each stage of the two-stage IPO process to the resolution of information asymmetry.

Two other related studies are Loffler, Panther, and Theissen (2005) and Chang et al. (2015). Loffler, Panther and Theissen (2005) study the IPO when-issued market in Germany, and find that trading in the shares of a future IPO during the few days prior to the actual offering reduces uncertainty. In contrast, Chang et al. (2015) study the mandatory pre-IPO market in Taiwan and find that pre-market prices are very informative about the post-market prices, but that underpricing remains substantial even in the presence of a pre-IPO market. They attribute this finding to agency problems between issuers and underwriters. Thus, existing studies provide mixed evidence on the issue of the ability of issuers to lower IPO uncertainty levels based on listing and trading prior to the traditional IPO process. Our study sheds light on this debate by providing evidence that IPO uncertainty levels decrease with pre-IPO trading and disclosure on

OTC market of firms that decide to get upgraded to U.S. national stock exchanges when meeting the respective enlisting criteria.

The paper is organized as follows. In Section II, we describe the institutional background, our hypotheses and our empirical methodology. In Section III, we describe our sample selection and data. In Section IV, we test whether the two-stage IPO method affects underpricing and post-offering volatility and examine additional benefits of the alternative IPO route that occur prior to the upgrade to a national exchange. In Section V, we discuss the tradeoffs between doing a two-stage IPO versus a traditional IPO, and, in Section VI, we provide a summary and conclusions.

II. Institutional Background, Hypotheses and Empirical Design

The presence of significant pre-IPO uncertainty suggests that companies most affected by it could benefit from a two-stage IPO process, in which a listing occurs first, followed by capital raising at later dates. One of the main benefits from first listing on a trading venue and having shares traded before raising capital is that investors can learn about a firm's quality and thus will not require compensation for this uncertainty in the form of significant underpricing on the day that the firm undertakes its first public equity offering. Thus, listing prior to raising capital can reduce valuation uncertainty. Given that valuation uncertainty is positively related to underpricing (Beatty and Ritter, 1986; Loughran and McDonald, 2013), and that underpricing is the main cost of going public (Ritter and Welch, 2002), the reduction in the valuation uncertainty for these firms should allow them to raise capital at better terms. We expect that this benefit will be greater for firms with higher levels of information asymmetry.

As mentioned above, a few recent studies analyze non-U.S. data on IPO listing without immediate capital raising (UK), IPO when-issued markets (UK and Germany), or mandatory, minimum six-month pre-IPO trading (Taiwan) to study the effect of information dissemination

prior to the IPO on valuation uncertainty. In these settings, firms either list on a national exchange and then raise capital over a certain period of time (UK, Taiwan), or their shares start trading informally just a few days before the actual IPOs (UK and Germany).

In contrast to these settings, the two-stage IPO mechanism in the U.S. on which we focus involves first getting quoted on one market, the OTC market, and then upgrading to another market, a national exchange, with the first public equity offering taking place on the national exchange concurrently with or after the upgrade. It is clear that getting quoted on the OTC market is a choice of the private firm that wants to start raising financing and provide public disclosure in order to gradually converge to the transparency standards required by national U.S. stock exchanges. Getting quoted on the OTC market does not require an underwriter, nor does the upgrade to a national exchange. After getting quoted on the OTC market, a firm could decide to provide disclosure to investors. Firms could do that 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 market-traded firm decides to upgrade to national stock exchanges, all the exchange's listing requirements must be met. The firm needs to file an application for listing and then be approved for listing by the national exchange.

Our first hypothesis concerns the information-asymmetry levels of two-stage IPO firms at the time of their first public-equity offering relative to their peers that opt for traditional IPOs. The two-stage IPO offers certain benefits when compared to a traditional IPO, including pre-IPO trading and disclosure, lighter initial disclosure requirements, continued access to capital while on the OTC, and no need for an underwriter involvement when upgrading to a national exchange. If pre-IPO trading and disclosure reduce information asymmetry about the firm, then

we should expect that two-stage IPOs will have lower underpricing at first public equity offering when compared to similar traditional IPOs.

We test this hypothesis against the null that the two-stage IPO method has no effect on valuation uncertainty. There are several reasons to expect no relationship between the two-stage IPO and uncertainty, and hence no difference between the uncertainty level of firms that pursue two-stage IPOs and those that select the traditional IPO method. First, the OTC market might not provide the liquidity and trading interest so as to reduce valuation uncertainty. Second, high volatility and incidences of fraud could reduce the potential benefits of trading on the OTC market. Third, prior studies have shown that the OTC market is less liquid and more volatile than the national exchanges.[4] Fourth, there could exist a stigma of low firm quality because of trading on the OTC market (e.g., being a "penny stock"), that could offset any benefits coming from listing and trading prior to doing a first public equity offering. Thus, our Hypothesis 1 asserts the following:

Hypotheses 1: Pre-IPO trading and disclosure reduces information asymmetry, so that a two-stage IPO experiences lower underpricing at the time of its first public equity offering than does a similar traditional IPO.

We next examine whether the first stage of the two-stage IPO mechanism contributes to the reduction of information uncertainty. Because a two-stage IPO undertakes its public equity offering after its upgrade to a national exchange (see discussion in Section III below), it typically starts disclosing information to investors before doing the IPO. Such disclosure will likely reduce information uncertainty. That means that the lower uncertainty could be due entirely to the mandatory disclosure that is part of the second stage of a two-stage IPO. We test for the contribution of the first stage to the reduction of information uncertainty by examining the information asymmetry levels of two-stage IPOs at the time of their upgrade to a national

[4] See, among others, Ang, Shtauber and Tetlock (2013).

exchange. If being quoted on the OTC market helps reduce information asymmetry, then two-stage IPO firms will have lower uncertainty than their traditional IPO peers even at the time of their upgrade to a national exchange. Additionally, we expect that the time spent on the OTC market and the amount of disclosure that firms provide while listed there will have an effect on the level of information uncertainty at the time of upgrade. For example, Bruggemann *et al*. (2013) find that more robust disclosure on the OTC market leads to higher market liquidity and price efficiency. Thus, it is reasonable to expect that a firm having been listed for a longer period of time, as well as a firm that discloses more information while on the OTC market (e.g., by providing 10-Ks and 10-Qs), will have lower information uncertainty than a firm having been listed for a short period of time or that does not disclose information to investors.

As mentioned above, the two-stage IPO also has some important limitations that stem from the nature of the OTC market. Those include lower liquidity, high volatility, lack of analyst following, higher cost of capital, and the potentially negative signal that an OTC market listing could send about the firm's quality.[5] Thus, it is possible that the first stage of the two-stage IPO process does not contribute significantly to the reduction in firm information asymmetry. We formulate our Hypothesis 2 as follows:

Hypotheses 2: The first stage of the two-stage IPO process contributes to information uncertainty reduction, so that, at the time of upgrade to a national exchange, a two-stage IPO has lower levels of information asymmetry than a similar traditional IPO. The level of information asymmetry will be lower the longer the firm has been quoted on the OTC market and the more disclosure it provides.

We test *H.1* and *H.2* by comparing the uncertainty/information asymmetry surrounding two-stage IPOs at the time of their first public equity offerings or their upgrades to a national exchange to that of firms doing traditional IPOs,. We measure uncertainty by using the IPO

[5] See, for example, Eraker and Ready (2015) and Ang, Shtauber, and Tetlock (2013).

underpricing and the post-offering stock-return volatility. To account for the potentially endogenous nature of the alternative IPO choice, we use two techniques. First, we compare our upgraded firms to a group of control firms that are selected based on propensity-score matching. The purpose of the propensity-score matching is to try to randomize the treatment of the type of IPO choice across sample firms by ensuring that the treated (two-stage IPOs) and the controls (traditional IPOs) are comparable on observed covariates that could drive the choice of two-stage IPO as an alternative to the traditional IPO. Second, we use a treatment-effect model (the switching regression model of Quandt, 1958, 1972; Maddala, 1983) to control for the potentially endogenous nature of upgraded firms. We estimate this model in two steps. In the first step, we estimate a Probit model that predicts the use of the two-stage IPO mechanism. The second step involves running a regression with the underpricing or post-offering volatility as a dependent variable and the predicted probability of a two-stage IPO (from Step 1) and a set of control variables on the right-hand side.

Our third hypothesis has to do with the time variation in information uncertainty for two-stage IPOs. One reason for why *H.1* and *H.2* could hold true is that two-stage IPOs are simply low-uncertainty companies from the very beginning, and remain such from the time of first OTC market quotes through upgrades and through their first public equity offerings on a national exchange. If this were the case, then they will have low uncertainty at the times of exchange upgrade and times of IPO compared to similar traditional IPOs. We expect, however, that listing and trading on the OTC market prior to graduation to a national exchange generates information about the firm taking the two-stage IPO route, resulting in lower levels of information asymmetry over time. We assert that a two-stage IPO experiences a decrease in information uncertainty from the time of the first OTC market quote until its first public equity offering on a national exchange. Thus, our third hypothesis posits the following:

Hypotheses 3: The level of information asymmetry for a two-stage IPO declines during the period of time between its first OTC market quote and the time of first public equity offering on a national exchange.

To test this hypothesis, we use the measure of uncertainty developed by Loughran and McDonald (2011, 2013). This measure handles the tone of the offering documents of a firm based on the usage of uncertain, negative, and weak modal words. We test for significant differences in these measures at the time of OTC market quotation and at the time of its IPO following the upgrade to a national exchange.

III. Data and Summary Statistics

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

III.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. 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, 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. Following Derrien and Kecskes (2007), we drop 24 firms whose public equity offerings come more than five years after the upgrade to a national exchange.[6] This leaves 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").

Of the 124 upgraded firms, 54 are SRMs. This SRM sample is drawn from two sources – the PrivateRaise SRM database and an extended hand-collection of data covering shell

[6] 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 are qualitatively unchanged from those reported here.

companies and the former private companies' specifics. The SRM database contains all consummated SRM transactions 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 Act and whether the public firm listed on a national market system licensed exchange, (c) the deal involves only two companies,[7] (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 criteria leaves us with a total number of 1,320 SRM observations (SRM master file). Of these, 94 are upgraded to main U.S. stock exchanges within three calendar years after their SRM consummation date. We find that 54 of the 94 upgraded SRM issuers also issue a public offering after their upgrade date. For all SRM firms, we have detailed information on their financials and institutional ownership prior to, and at, the time of the SRM, which is the time of listing on the OTC market. We also have information on their capital raisings through private placements in public equity (PIPEs) transactions. We use these data later in our analysis to test some of our hypotheses regarding the benefits of the alternative IPO route.

We compare the sample of two-stage IPOs to a sample of firms doing 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. We exclude issues with an offer price lower than $1, American Depositary Receipts (ADRs), Real Estate Investment Trusts

[7] Triangular RMs are included in the sample as they constitute the most common form of RMs. In triangular deals, the public shell creates an empty wholly owned subsidiary. The subsidiary then merges into the private company. The subsidiary of the shell disappears and the private company becomes a wholly owned subsidiary of the shell company. The owners of the formerly private company own a majority of the shares in the shell after the consummation of the deal.

(REITs), spin-offs, closed-end funds, issues involving tracking stock, unit offerings, rights offerings, blank-check companies, closed-end funds, 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. This leaves us with a traditional IPO sample of 1,903 firms.

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 their IPO gets withdrawn, and eventually go public after a few years. We have 170 such IPOs.[8]

III.B. Summary statistics

Table 1 presents summary statistics for the samples of upgraded firms and traditional IPO firms. Panel A of Table 1 shows the yearly distributions of the two-stage IPOs, the Upgrades (those upgraded firms that do not do a public equity offering after the upgrade) and the traditional IPOs. As the table shows, the use of the two-stage IPO route picks up after 2003, and, in the two most severe years of the financial crisis (2008-2009), this type of IPO is actually more prevalent than the traditional 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.[9] Another possible explanation for the upward trend in two-stage IPOs is the

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

[9] 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.

increased difficulty and cost of going public for smaller companies, as manifested by the lower numbers of traditional IPOs after 2000.[10]

Panel B presents some summary statistics for the samples of two-stage IPOs and Upgrades on 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 for about a year before their first public equity offerings, during which they can disclose information to investors, which could decrease the levels of information asymmetry at the time of the offerings. Derrien and Kecskes (2007) report an average (median) time from listing on the AIM exchange to first equity offering of 1.1 (0.9) years for their U.K. sample of 66 two-stage IPOs, which, when converted into months, is approximately 13 (11) months-- similar to our sample statistics. Additionally, both two-stage IPOs and Upgrades spend, on average, more than four years (56 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 disclosure while on the OTC market 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, we find that many of our firms begin disclosure of information 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 while on the OTC market. To us, this indicates the intention of these firms, at some future point of time, to upgrade to a national exchange. Two-stage IPOs tend to provide more disclosure than Upgrades.

[10] Specifically, for the years 2008 and 2009, in untabulated results, we compare the firms that conducted a two-stage IPO in these two years to the traditional IPOs in the same period. We find that two-stage IPOs in 2008 and 2009 are significantly less liquid, less levered, larger, and with greater capital expenditures. We conclude that, based on these two years, the two-stage IPO and traditional IPO mechanisms could function as substitutes and it is a choice of the potential issuer which path to follow. Our untabulated findings are available upon request.

Panel C of Table 1 presents summary statistics for some financial variables for the two-stage IPOs, Upgrades, and the traditional IPOs in the year prior to, and the year of, their IPOs (for two-stage and traditional IPOs) and their years of upgrade (for Upgrades). As can be seen from the table, the two-stage IPOs and Upgrades differ significantly from traditional IPOs on a number of dimensions. They have smaller revenues, are less levered, have a larger fraction of intangible assets, and have lower capital and R&D expenditures prior to the IPO/upgrade. Most of these differences remain significant in the year of IPO/upgrade. These differences underline the need to control for the potentially endogenous nature of the two-stage IPOs in the empirical analysis. In our internet appendix, we present the industry distribution of the traditional IPOs and the two-stage IPOs, respectively. Our findings suggest that our analysis explaining uncertainty is unlikely to be solely driven by an industry effect, but we still control for industry effects in our later tests. Additionally, two-stage IPOs and Upgrades rely much more frequently on private offerings compared to their traditional IPO peers. In untabulated results, we find that 84% of two-stage IPOs use private offerings prior to their first public offering, compared to only 43% of traditional IPOs.

Lastly, in Panel D of Table 1, we present some IPO offering statistics for two-stage IPOs and traditional IPOs. The two types of IPO firms differ significantly with regard to IPO proceeds, 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.

IV. Empirical analysis

IV.A. Uncertainty levels at the time of first public equity offering

To test the *reduced-uncertainty hypothesis*, we compare 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, this is the IPO date – the first public equity offering that takes place following the upgrade to the national exchange. As indicated in Section III, we have 124 two-stage IPOs. 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). 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.[11] Panel A of Table 2 presents the univariate results for the underpricing and the post-offering return volatility. The medians of both variables are significantly smaller (at better than 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 withdrawn traditional IPOs. The rationale is that these firms disclose information to investors through the IPO prospectus at their first IPO attempt, which may reduce the information uncertainty when they go public the second time. As seen from Panel A of Table 2, the underpricing of these withdrawn IPOs (median of

[11] In measuring the post-offer stock return volatility, we follow the approach of Loughran and McDonald (2013).

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.

Given that the first public-equity offering for a two-stage IPO occurs, as Panel B of Table 1 suggests, on average about a year after the listing on the national exchange, it is interesting to see how the two-stage IPO underpricing compares to the underpricing of seasoned equity offerings (SEOs) of traditional IPO firms. Since some time passes between the public offering and the subsequent SEO of a traditional IPO firm, the disclosure and trading that take place during that time are likely to reduce information uncertainty and hence generate similar benefits – significantly lower underpricing and volatility – like the two-stage IPO. In fact, the existing empirical evidence on the underpricing of SEOs (e.g., Corwin, 2000) suggests that it is much smaller than IPO underpricing.

We report the underpricing and post-offering volatility associated with the first SEOs of traditional IPO firms in Panel B of Table 2. We examine the SEOs of traditional IPOs that undertake a secondary offering within 17 months of their IPO, since that is the average length of time between an exchange upgrade and a first public equity offering for the two-stage IPOs (Panel B of Table 1).[12] The evidence suggests that the underpricing and post-offering volatility of two-stage IPOs are similar to the underpricing and post-return volatility at the time of the SEOs of traditional IPOs. As the results in Panel B of Table 2 show, the underpricing of two-stage IPOs (a median of 3.6%) is significantly larger than that of SEOs of traditional IPOs (a median of 1.8%), but the difference in post-offering volatility is not statistically significant. We interpret this finding as two-stage IPOs benefiting from OTC market trading to become more transparent and lower their information asymmetry prior to conducting their first public equity

[12] As an additional test, we use a sample of SEOs that are undertaken within five years of the traditional IPO. The five year restriction is the same as the restriction we place on two-stage IPOs: maximum of five years from upgrade to first public equity offering. The mean (median) underpricing of that sample is 3.5% (2.1%) and the median remains significantly smaller than that of the two-stage IPOs. We do not find any differences in stock-return volatility.

offering on the national stock exchanges. On the other hand, a traditional IPO firm conducting its SEO faces lower underpricing because of the information that it has released during the registration of its IPO and all of its disclosure activity thereafter. In a way, disclosure taking place during OTC market trading could be compared to disclosure between the IPO and SEO activity on the national stock exchanges. This finding suggests that two-stage IPOs fall between traditional IPOs and SEOs in terms of degree of information asymmetry, but they tend to be closer to SEOs.

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 and a treatment effects model (see Maddala, 1983) in addition to the OLS regression analysis.

The control variables we include in the analysis are identified by prior studies as important determinants of underpricing and return volatility.[13] 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*). Additionally, we control for industry effects (based on two-digit SIC codes) and time effects, and cluster standard errors by industry and year.

Table 3 presents the regression results for the underpricing and the post-offering return volatility. In Panel A we show the OLS regression results. The coefficient on *Two-stage IPO* is negative and significant in both the underpricing regression (Models 1 and 2) and the return volatility regression (Models 3 and 4). The coefficient in Model 1 is -0.085, indicating that the

[13] For example, see Loughran and McDonald (2013).

underpricing of two-stage IPOs is lower than that of traditional IPOs by 8.5%. When *Reputable underwriter* and *VC-backed* are included in the regression (Model 2), the coefficient on *Two-stage IPO* in the underpricing regression decreases substantially (to -0.036), but remains statistically significant. The coefficient on *Two-stage IPO* in the volatility regression (Model 3) is negative and significant and is essentially unchanged (Model 4) following the inclusion of *Reputable underwriter* and *VC-backed*. Among our control variables, we find that more profitable and, in some of the specifications, larger firms experience lower levels of underpricing and volatility following an equity offering, consistent with previous studies.

Panel B of Table 3 presents our results based on propensity-score matched samples. For each firm in our sample, the propensity score is estimated as the predicted value of a Probit model for the choice between doing a two-stage IPO versus a traditional IPO. The dependent variable of the model is equal to one if the firm is a two-stage IPO, and zero otherwise. As controls, we include 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, Venture Capital (VC) financing, and the presence of a reputable underwriter. We perform all matching with replacement (the same matching firm can be used more than once as a match) because Abadie and Imbens (2006) argue that this reduces bias. Panel B1 of Table 3 presents some evidence on the quality of our matching, showing the means in the treated and control groups before and after matching, along with t-tests for significant differences in means. Prior to the matching, there are large and significant differences between means of the samples of treated firms (two-stage IPOs) and control firms (traditional IPOs). After matching, we find that the covariates of the Probit model are well balanced across both the treatment and control groups: none of the differences in means of the two groups are statistically significant.

The Average Treatment Effects (ATEs) presented in Panel B2 of Table 3 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 2. 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 B2 of Table 3 also suggest that the two-stage IPO firms have lower post-offering volatility (difference of 0.5%, with p-value of 0.07).

Finally, Panel C of Table 3 presents the results from the treatment-effects model using the two-step estimator of Maddala (1983). Panel C1 shows the first stage of the model. 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. As can be seen, the coefficients on most of the control variables are statistically significant. Larger firms, less profitable firms and firms with more tangible assets and lower leverage are more likely to go the two-stage IPO route. Additionally, firms without VC backing are more likely to do a two-stage IPO. We also control for time effects.

Panel C2 in Table 3 presents the underpricing and volatility results, which is similar to the OLS results in Panel A, except that we include the predicted two-stage IPO probability estimated using the model in Panel C1 instead of an indicator variable for two-stage IPO firms. For the underpricing model, the coefficient estimates are similar in magnitude to the propensity-

score matching results in Panel B2. 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 3 generally supports *H.1*, 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.B. Does the first stage of the two-stage IPO process contribute to reduction in uncertainty?

In the previous subsection, 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 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 *H.2*), and then investigate the time changes in uncertainty from the time of first quote on the OTC market until initial public offering (i.e., test of *H.3*). We also examine the sample of Upgrades, the firms that do not issue equity after their upgrade to a national exchange, to see whether they also experience lower levels of uncertainty compared to similar traditional IPOs at the time of upgrade to a national exchange.

IV.C.1. Uncertainty levels of two-stage IPOs and upgrades at the time of the upgrade

We test *H.2* by examining the level of uncertainty surrounding two-stage IPOs and Upgrades 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 and Upgrades 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 4, we present the results of the post-upgrade volatility analysis for the two-stage IPOs. The univariate results in Panel A of Table 4 show no significant difference in the stock-return volatility of two-stage IPOs and traditional IPOs at the time of listing on a national exchange. Being quoted on the OTC market by itself, however, may not automatically lower uncertainty. Large swaths of the OTC market are illiquid and do not require firms to provide periodic disclosure to investors. This lack of liquidity and disclosure suggests that for some firms information asymmetry could be high for a prolonged period of time on the OTC market. *H.2* asserts that firms that provide 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. 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 volatility than providing average or low level of disclosure. We also examine whether the level of uncertainty at upgrade depends on whether firms disclose voluntarily or are required to provide disclosure.

There is a long-standing debate in the accounting literature on the merits of voluntary versus mandatory disclosure.[14] We use the fact that some of our firms disclose voluntarily while others are required to do so either because they are listed on the OTC market bulletin board (which requires SEC reporting) or because they have more than 300 stockholders of record, which triggers SEC reporting.

In Panel B of Table 4, we present the results of the propensity-score analysis, where, for each two-stage IPO, we select a matched firm that undergoes a traditional IPO. The propensity-score matching is based on the same Probit model used in the previous sub-section, with the only difference being that, for the two-stage IPOs, we now use the date of the upgrade instead of the date of first public offering as a starting point. Panel B1 presents statistics on the quality of matching between treated (two-stage IPOs) and control firms (traditional IPOs). It can be seen that our matches are fairly close: after matching, none of the variables used to calculate the propensity score are significantly different between treated and control firms at even the 10% level.

[14] See Lang and Lundholm (2000), Leuz and Verrecchia (2000) Healy and Palepu (2001).

The estimates of the ATEs appear in Panel B2 of Table 4, and show 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 C of Table 4 presents the coefficient estimates of the treatment-effects 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. We also do not find a significant effect of mandatory versus voluntary disclosure.

As an additional test of *H.2*, we perform similar analysis on the subsample of Upgrades (the upgraded firms without subsequent initial public offering). If OTC market listing helps reduce uncertainty, we expect that the Upgrades will also have lower levels of uncertainty at the time of upgrade to a national exchange compared to similar traditional IPOs. Table 5 presents the results from this analysis. In Panel A, we test for significant univariate differences in the median volatility of Upgrades and traditional IPOs, and find that the average upgraded firm has a level of uncertainty that is similar to that of peer traditional IPOs. In Panel B, we present results based upon propensity-score matched Upgrades and traditional IPOs, and find that Upgrades in the top disclosure quartile enjoy lower levels of uncertainty than do traditional IPOs, while Upgrades in

the bottom disclosure quartile do not.[15] Lastly, Panel C presents the results from the treatment-effects model. The coefficient of *Upgraded probability* is negative and statistically significant in all specifications. Consistent with the results from propensity-score matching in Panel B, we find non-linearity in the relationship between disclosure and uncertainty. In Models 2 and 3 the coefficient on *Amount of disclosure*^{2} has a negative and statistically significant coefficient, suggesting that Upgrades that disclose a lot of information to investors while on the OTC market tend to have lower level of uncertainty at the time they get upgraded to a national exchange. As in Table 4, we do not find a significant effect of the mandatory versus voluntary disclosure.

Thus, the results of the volatility analysis at the time of upgrade for both two-stage IPOs and Upgrades suggest that the first stage in the two-stage IPO process does reduce uncertainty, which lowers the indirect cost of capital raising when upgrading to the national stock exchanges. Both two-stage IPOs and Upgrades tend to have lower volatility than similar firms doing a traditional IPO, providing support for *H.2*. We also find some evidence that those two-stage IPOs making significant disclosures to investors while on the OTC market tend to have lower volatility compared to peers that provide very little disclosure or do not provide disclosure at all.

IV.C.2. Time changes in uncertainty of two-stage IPOs

In this subsection, we test *H.3*, which posits that being quoted on the OTC market leads to lower uncertainty over time. We perform two tests to explore the validity of *H.3*. Our first test uses a subsample of two-stage IPOs that become quoted on the OTC market as a result of an SRM, because for those firms we have a richer data set that allows us to track them from the moment they complete their SRM transaction and get quoted on the OTC market until their upgrade to a national exchange. Our second test examines the changes in discounts on one type

[15] For the sake of brevity, here we do not report the results on the quality of the matching in a separate table. We do find, however, that the covariates of the Probit model are well balanced across both the treatment and control groups: none of the differences in means of the two groups after the matching are statistically significant. The results are available upon request.

of private offerings that two-stage IPOs and upgrades frequently rely on: Private Investments in Public Equity (PIPEs).

One of the potential benefits of the two-stage IPO process is the decrease in the level of uncertainty from the time of first OTC market quotation until first public-equity offering on the national exchange. Since we do not have data on prices and returns during the time that two-stage IPOs trade on the OTC market, we use an alternative measure of uncertainty that does not depend on prices. We use the textual analysis-based uncertainty measure 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 strong words developed by Loughran and McDonald (2011), we count the number of such words in an offering document. We combine the counts for the three types of words to create an aggregate number of uncertainty words per document. We then calculate the *fraction of uncertain words* as the ratio of the number aggregate uncertain 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. 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 the 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).[16] 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 6 presents the analysis of how the fraction of uncertain 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 uncertain words goes down from 3.15% at the time of SRM to 2.27% at the time of first equity offering. 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. The test results suggest 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. This finding provides support for *H.3* and is 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.

As an additional test of *H.3*, we compare the PIPE discounts that two-stage IPOs and Upgrades incur while being quoted on the OTC market to those after their upgrade to a national

[16] Similar to S-1 registration documents, the super 8-K documents contain the following sections: Overview/description of business, industry and analysis of competitors, risk factors, management's discussion and analysis of financial condition and results of operations, beneficial ownership, board of directors composition, compensation of executive officers, exhibits with material contracts, dividend policy and description of securities. With regards to the financial statements and exhibits section of the Form 8-K, issuers must include historical financial statements of the acquired private operating business. In particular, the Form 8-K must include two years of audited financial statements and unaudited reviewed interim periods to the date of filing. The 8-K forms also contain a detailed description of the shell reverse merger transaction. To summarize, super 8-Ks must include all the information that would be required by the SEC in order to register the shares considered for a public offering prospectus. Interestingly, post-2011 the SEC regularly reviews super 8-K documents, even though this is not required.

exchange. We use PIPE transactions since they are one of the most significant means of financing for firms quoted on the OTC market (see, for example, Floros and Sapp, 2012). If the two-stage IPO process results in the revelation of important information about the firm, this information should be incorporated into the price of private offerings. Thus, we conjecture that, for two-stage IPOs and Upgrades, the pricing of their private offerings becomes better (i.e., the offering discounts will decrease) over time.

In Panel B of Table 6, we list the median cross-sectional PIPE discounts of the first PIPE offering after getting quoted on the OTC market and compare them to the median discounts of the first PIPE offering after these firms get upgraded to a national exchange. As the table shows, the PIPE discount decreases significantly from about 16% at the beginning of the OTC market period to approximately 8% once the firm is upgraded to a national exchange (both during the OTC market trading as well as the national exchange trading the predominant leading PIPE financing source are the hedge funds). We note that our findings indicate that OTC market trading associated with elevated disclosure (as is the case with our firms that get upgraded to national exchanges) decreases price discounts to considerably low levels. Huson, Malatesta and Parrino (2010) report the trend of PIPE discounts - without separating their analysis by the trading platform - for the period of 1995 to 2007 and the median values amount to 11.11% (15.51% for pre-2001 PIPEs and 8.51% for post-2000 PIPEs). They attribute the downward trend in PIPE discounts to changes in a) PIPE issuer characteristics, b) the pricing of issue and issuer characteristics and c) contracting practices. Such a significant decrease is consistent with H3: going the two-stage IPO route seems to result in lower uncertainty over time and consequently lower cost of raising capital.

Of course, an alternative explanation for the decrease in PIPE discounts could be that these firms become less risky over time. In fact, these two explanations may not be mutually

exclusive since a firm could both experience a decrease in information uncertainty and reduction in risk. Due to the lack of price data during the OTC market period, however, we cannot disentangle the effects of reduction of information asymmetry and the reduction in risk on the PIPE discounts. Hence our results from the PIPEs discounts analysis are only suggestive in nature.

V. Why aren't most firms pursuing the two-stage IPO route?

Given the evidence presented in the previous section that two-stage IPOs have lower uncertainty and hence lower underpricing at the time of their first public equity offering, a natural question arises: Why aren't the majority of private firms using this strategy to go public? Based on our findings, firms doing the two-stage IPO could benefit significantly from the reduced underpricing, leaving less money on the table and raising more capital for future investments. Yet, the number of upgraded firms, although experiencing a significant increase in recent years, is still no match for the number of traditional IPOs.

In our opinion, the reason is that there could be other benefits from going the traditional IPO route that outweigh the benefits from reduced uncertainty through a two-stage IPO. For example, having a reputable underwriter and being able to use the various services it provides, may be more important than lower underpricing for a company that is considering going public. We find that traditional IPOs employ lead reputable underwriters much more frequently than their counterparts that go for a two-stage IPO. For example, 69% of traditional IPOs in our sample use a reputable lead underwriter, whereas only 24% of two-stage IPOs do so. Since the two-stage IPO does not involve an underwriter during the first stage and at the time of upgrade to a national exchange, certain firms may find that going public mechanism less desirable.

Additionally, the nature of the investors in the firms that are considering going public might affect the choice of the going public strategy. For VCs, an IPO is the most profitable exit, and going public in a larger and very liquid market might be preferable to doing a two-stage IPO with lower underpricing. A large number of traditional IPOs (approximately 58% in our sample) are backed by VCs, while, for the two-stage IPO subsample, this percentage is relatively small (approximately 18%). This difference in VC presence could also be a potential explanation for the smaller numbers of two-stage IPOs. Even aside from the presence of specialized investors like VCs, the involvement of institutional investors per se could play a role in a firm's preference for a going public mechanism. While a detailed analysis of the type and sophistication of investors that prefer two-stage IPOs versus traditional IPOs is beyond the scope of this paper, in Table 7 we present some analysis suggesting that investor type may be associated with the choice of IPO mechanism. The table lists the institutional ownership holdings of two-stage IPOs and traditional IPOs in the eight quarters surrounding the upgrade to a national exchange (for two-stage IPOs) and the IPO date (traditional IPOs) as drawn from Thomson Reuters quarterly 13F institutional ownership filings.

It is clear from the data that the institutional ownership is much larger in traditional IPOs compared to their two-stage peers. The presence of institutional investors could by itself reduce the level of information uncertainty of a company. Thus, it is plausible to expect that firms with little institutional presence may opt to replace such presence by trading on a different market venue and providing disclosure prior to the first public offering – in a sense, to go for a two-stage IPO. In our opinion, this type of analysis presents a promising venue for future research.

Additionally, a recent study by Liu and Ritter (2011) argues that firms going public may care more about non-price dimensions of underwriting, such as all-star analyst coverage, and VC-backed IPOs might be particularly focused on obtaining all-star analyst coverage. They find

that VC-backed IPOs have more all-star coverage, but also more underpricing, thus supporting the argument that analyst coverage, and potentially other services provided by the lead underwriters, could offset the negative impact of higher underpricing. Our analysis suggests traditional IPOs are more likely to have analyst coverage than two-stage IPOs. Approximately 88% of the subsample of traditional IPOs is followed by analysts, while for the sample of two-stage IPOs and upgrades this percentage is 67%; the difference is statistically significant.

In addition, we estimate a Cox proportional hazard model of time-to-analyst coverage. The sample includes two-stage IPOs, Upgrades, and traditional IPOs with data on analyst coverage and EPS forecasts from the Institutional Brokers' Estimate System (I/B/E/S) database. Since some firms do not have I/B/E/S data, the sample size is smaller than that used in Tables 3, 4, and 5, and the total number of observations drops from 2,210 to 1,916 for two-stage IPOs, Upgrades and traditional IPOs. For two-stage IPOs and Upgrades, the time to first analyst coverage is defined as the number of days from the date of upgrade to a national exchange to the date of first analyst earnings forecast. For the traditional IPOs, the time to first analyst coverage is defined as the number of days from the IPO date to the date of first analyst earnings forecast. Very few firms have analyst following prior to IPO/upgrade; in these cases we set our dependent variable (the time to analyst coverage) equal to zero.[17] As explanatory variables, we include firm size, profitability, R&D ratio, a dummy for missing R&D, and industry and time indicators. The results, shown in Table 8, suggest that two-stage IPOs and Upgrades have lower hazards and therefore longer time to analyst coverage. These results are consistent with the argument that firms pursuing a traditional IPO might place a higher value on analyst coverage rather than on underpricing.

[17] For robustness, we repeat the analysis while dropping such observations from the sample and the results we obtain are qualitatively similar to those in Table 8.

VI. Conclusion

In this study, we examine 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, and AMEX where it makes its first public equity offering. We test whether such a two-stage IPO process leads to a lower level of uncertainty at the time of the upgrade on a national exchange and at the time of first public equity offering following that upgrade. We hypothesize that 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.

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 two-stage IPOs experience significantly lower underpricing than similar traditional IPOs when they undertake their first public equity offering following the upgrade to a national exchange. We also find that two-stage IPOs experience lower stock-return volatility, both after the upgrade on a national exchange and after their first public equity offering. Lastly, our analysis shows that companies choosing the alternative IPO route experience a significant decrease in uncertainty from the time of initial quotation on the OTC market until their first public-equity offering. We conclude that pre-IPO trading and accompanying disclosure, even in a low-visibility environment such as the OTC market, leads to resolution of uncertainty and corresponding lower underpricing and lower levels of volatility at the time of initial public-equity offering on a national exchange.

Internet Appendix A
Sample by industry distribution

This table presents the industry distribution of the sample of two-stage IPOs and traditional IPOs. It lists the top 10 industries represented in each subsample across all sample years. Industry definitions are based on two-digit SIC codes.

Traditional IPO Firms			Two-stage IPO Firms		
Industry	**Frequency**	**% of Subsample**	**Industry**	**Frequency**	**% of Subsample**
Business services	596	31.5	Chemicals and allied products	64	20.4
Chemicals and allied products	245	12.9	Business services	39	12.4
Electronic & other electric equipment	172	9.1	Oil & gas extraction	29	9.2
Instruments and related products	146	7.7	Electronic & other electric equipment	25	8.0
Industrial machinery & equipment	91	4.8	Communications	17	5.4
Communications	79	4.2	Instruments & related products	15	4.8
Miscellaneous retail	53	2.8	Industrial machinery & equipment	11	3.5
Engineering & management services	49	2.6	Food & kindred products	10	3.2
Oil & gas extraction	39	2.1	Metal, mining	10	3.2
Health services	32	1.7	Transportation equipment	9	2.9
Other	391	20.6	Other	85	27.0
Total	**1,893**	**100.00**	**Total**	**314**	**100.00**

Appendix

Variable	Definition
Amount of disclosure while on the OTC market	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
Analyst coverage	The binomial dummy variable that takes the value of 1, if there is at least one analyst reported in I/B/E/S database to cover the firm in a specific quarter, and 0 otherwise.
CAPEX ratio	Ratio of net capital expenditures over total assets
Cash ratio	Ratio of cash holdings over total assets
Intangible assets ratio	Ratio of intangible assets over total assets
Investments ratio	Ratio of capital expenditures and research and development expenditures over total assets
Log(Sales)	Natural logarithm of Total sales/turnover
Mandatory disclosure	Dummy variable that takes the value 1 if the firm is required to provide disclosure (either because it is quoted on the OTC Bulletin Board which requires SEC reporting, or because it has more than 300 shareholders of record, which also triggers SEC reporting), and 0 otherwise
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
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.
PIPE 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.
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
R&D ratio	Ratio of research and development expenses over total assets
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
Sales	Total sales/turnover
Share overhang	The number of shares retained divided by the number of shares in the initial offering
Time on the OTC market	Time spent on the OTC market
Time to first public equity offering	The time from upgrade to a national exchange to first public equity offering
Time since first disclosure	Time from first disclosure until upgrade
Total assets	Book value of total assets
Total book leverage ratio	Ratio of short-term debt and long-term debt 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
Underpricing	The difference between first-day closing price and the offer price divided by the offer price
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)
VC-backed	Dummy variable that takes the value of 1 if IPO is VC-backed, and 0 otherwise

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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.

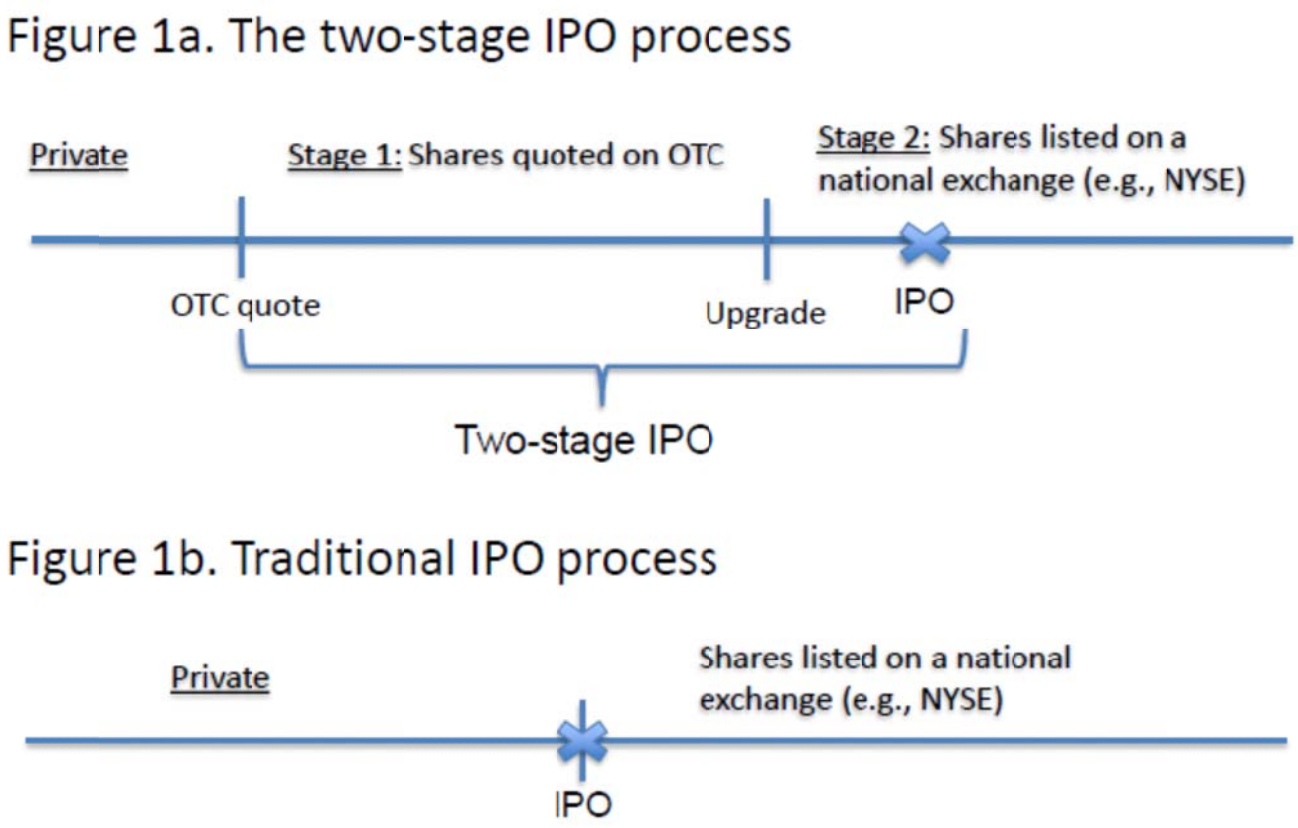

Table 1
Summary statistics

This table (all panels), counts on the sample 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*). In Panel C, we compare all upgrades to the subsample of traditional IPOs. All variables are defined in the Appendix. Panel C summary stats and their comparison are separated by year (year before and year of the IPO (for Two-stage and traditional IPOs) or the upgrade (for Upgrades)). In Panel C, we compare IPO characteristics for two-stage and traditional IPOs, respectively. The symbols ***, **, * represent statistically significant differences between upgraded firms and traditional IPOs at the 1 percent, 5 percent, and 10 percent based on nonparametric Mann-Whitney test for equality of medians.

Panel A. Annual distribution of upgrades and traditional IPOs

Year	Two-stage IPOs	Upgrades	Two-stage IPOs and Upgrades as % of Traditional IPOs	Traditional IPOs
1996	0	1	0.4%	281
1997	1	4	1.8%	271
1998	0	7	4.7%	150
1999	3	2	1.9%	264
2000	0	22	10.5%	210
2001	0	3	10.0%	30
2002	0	4	11.8%	34
2003	3	6	34.6%	26
2004	4	14	18.8%	96
2005	8	14	33.8%	65
2006	7	12	21.6%	88
2007	21	27	43.6%	110
2008	12	12	218.2%	11
2009	26	9	194.4%	18
2010	15	21	64.3%	56
2011	7	6	25.5%	51
2012	8	6	27.5%	51
2013	9	13	24.2%	91
Full Sample	124	183		1,903

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

Variable	Mean	Median	Number of companies
Two-stage IPOs			
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
Upgrades			
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. Firm characteristics as of the year before/of the IPO (for two-stage IPOs and traditional IPOs) and year before/of the upgrade to a national exchange (for Upgrades).

C1.Year prior to IPO offering (for Two-stage IPOs and Traditional IPOs) and year of upgrade (for Upgrades)

	Traditional IPOs (N=1,903)			Two-stage IPOs and Upgrades (N=307)		Upgrades (N=183)			Two-stage IPOs (N=124)	
Variables	Mean	Median		Mean	Median	Mean	Median		Mean	Median
Total assets	152.67	26.30		78.46	24.57	66.10	16.56	***	96.89	43.17
Sales	133.63	22.97	***	92.28	13.36	43.55	9.67	***	163.77	25.60
Total book leverage ratio	0.71	0.55	***	0.44	0.36	0.44	0.39		0.45	0.33
Intangible assets ratio	0.07	0.00	***	0.11	0.01	0.12	0.01		0.10	0.02
Cash ratio	0.33	0.24	*	0.30	0.20	0.32	0.21		0.28	0.19
R&D ratio	0.37	0.22	***	0.27	0.04	0.27	0.04		0.27	0.04
CAPEX ratio	0.09	0.06	***	0.08	0.04	0.07	0.03	*	0.10	0.05
Profitability	-0.28	0.01	**	-0.43	-0.03	-0.50	-0.04		-0.32	-0.03
Investments ratio	0.46	0.30	***	0.32	0.13	0.32	0.13		0.32	0.13

C2. Year of IPO offering (for Two-stage IPOs and Traditional IPOs) and year of upgrade (for Upgrades)

	Traditional IPOs (N=1,903)			Two-stage IPOs and Upgrade (N=307)			Upgrades (N=183)			Two-stage IPOs (N=124)	
Variables	Mean	Median		Mean	Median		Mean	Median		Mean	Median
Total assets	259.26	89.17	***	121.74	44.75		106.35	29.78	***	145.07	82.85
Sales	176.65	42.12	***	117.57	25.30		75.62	20.71	**	181.16	32.16
Total book leverage ratio	0.30	0.23	***	0.36	0.31		0.40	0.33	**	0.32	0.23
Intangible assets ratio	0.09	0.00	***	0.13	0.03		0.15	0.03		0.10	0.02
Cash ratio	0.49	0.52	***	0.31	0.22		0.29	0.21		0.34	0.26
R&D ratio	0.14	0.10	***	0.14	0.04		0.13	0.05		0.15	0.03
CAPEX ratio	0.07	0.04		0.09	0.03		0.08	0.03		0.09	0.04
Profitability	-0.05	0.02	***	-0.23	-0.02		-0.26	-0.03		-0.19	-0.00
Investments ratio	0.19	0.15	***	0.20	0.13		0.20	0.14		0.20	0.13

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

	Traditional IPOs (N=1,903)			Two-stage IPOs (N=124)	
Variables	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
Nasdaq return	-0.1%	0.1%		0.1%	0.1%

Table 2
Underpricing and volatility of two-stage IPOs and traditional IPOs

Panel A of the 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. Underpricing is defined as the difference between first-day closing price and the offer price divided by the offer price. Post-offering return volatility is the market model root-mean square error for each firm over day +5 to day +64 relative to the offer day. 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. Panel B presents the underpricing of the first seasoned equity offering (SEO) of a subsample of traditional IPO firms. First SEO of traditional IPOs is defined as the first seasoned offering that occurs within 17 months of the IPO offer date. In both Panel A and Panel, p-values are based on nonparametric Mann-Whitney test for equality of medians.

Panel A. Two-stage IPOs and traditional IPOs

	Number	Underpricing		Post-offering return volatility	
	of obs.	Mean	Median	Mean	Median
Two-stage IPOs	124	5.0%	3.6%	0.040	0.035
Traditional IPOs	1,903	30.5%	13.3%	0.049	0.043
Wilcoxon rank-sum test for $Median_{Two\text{-}stage\ IPO} = Median_{Traditional\ IPO}$			Z = -6.86 Prob > |Z| = 0.01		Z = -5.64 Prob > |Z| = 0.01
Traditional IPOs that were initially withdrawn	170	29.5%	12.1%	0.050	0.045
Wilcoxon rank-sum test for $Median_{Two\text{-}stage\ IPO} = Median_{Traditional\ IPO}$			Z = -4.12 Prob > |Z| = 0.01		Z = -3.47 Prob > |Z| = 0.01

Panel B. Two-stage IPOs and SEOs of traditional IPOs

	Number	*Underpricing*		*Post-offering return volatility*	
	of obs.	Mean	Median	Mean	Median
SEOs of traditional IPOs that are within 17 months of the IPO offer date	449	2.9%	1.8%	0.042	0.037
Wilcoxon rank-sum test for $Median_{Two\text{-}stage\ IPO} = Median_{Traditional\ IPO}$			Z = 2.10 Prob > |Z| = 0.04		Z = -0.77 Prob > |Z| = 0.44

Table 3
Uncertainty at the time of first public equity offering

This table presents the results of the analysis of underpricing and post-offering return volatility. Underpricing is defined as the difference between first-day closing price and the offer price divided by the offer price. Post-offering return volatility is the market model root-mean square error for each firm over day +5 to day +64 relative to the offer day. All control variables are defined in the *Appendix*. Panel A presents the results from an OLS regression of underpricing and the post-IPO return volatility on a set of control variables. Robust *t*-statistics in parenthesis. Standard errors are clustered by time and industry. Panel B presents the difference 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 C presents the first and second stage results of a treatment effects model (Maddala (1983)). The symbols ***, **, * represent statistical significance at the 1 percent, 5 percent, and 10 percent, respectively.

Panel A. OLS regression

Dependent variable:	Underpricing		Post-offering return volatility	
	(1)	(2)	(3)	(4)
Two-stage IPO	-0.085**	-0.036***	-0.006*	-0.005*
	(-2.19)	(-2.70)	(-1.75)	(-1.77)
Log($Sales_{t-1}$)	-0.003	0.003	-0.002**	-0.002**
	(-0.68)	(0.28)	(-2.29)	(-2.21)
$Profitable_{t-1}$	-0.226**	-0.160**	-0.012***	-0.012***
	(-2.55)	(-2.33)	(-4.16)	(-4.49)
Share overhang	0.023	0.021	0.004	0.005
	(1.35)	(1.39)	(0.62)	(0.67)
Reputable underwriter		0.139**		-0.001
		(2.26)		(-0.44)
VC-backed		0.098**		0.002**
		(2.39)		(2.31)
Nasdaq return	1.141	1.241	-0.045	-0.046
	(0.86)	(0.96)	(-1.54)	(-1.61)
Industry indicators	Yes	Yes	Yes	Yes
Time indicators	Yes	Yes	Yes	Yes
Num. Obs.	2,027	2,027	2,027	2,027
Adjusted R^2	15.7%	16.3%	23.8%	25.1%

Panel B. Propensity score matching

B1. Covariate balance of two-stage IPOs (Treated) and traditional IPOs (Controls)

		Controls before matching		Controls after matching	
Variable	Mean (Treated)	Mean (Controls)	t-statistic for difference in Means	Mean (Controls)	t-statistic for difference in Means
$Sales_{t-1}$	163.77	133.63	0.39	168.05	-0.05
Tangible assets $_{t-1}$	0.28	0.22	3.39	0.25	1.05
$Profitability_{t-1}$	-0.32	-0.28	-0.31	-0.39	0.60
IPO year	2010	2001	17.23	2010	-0.42
Reputable underwriter	0.10	0.70	-14.53	0.11	-0.41
VC-backed	0.16	0.59	-9.92	0.16	-0.17
Book leverage $_{t-1}$	0.21	0.33	-2.21	0.24	-0.67
Cash ratio $_{t-1}$	0.24	0.27	-1.04	0.28	-1.11
Investments ratio $_{t-1}$	0.25	0.36	-1.40	0.27	0.35
Num. Obs.	124	1,903		64	

B2. Average treatment effects

Variable of interest	Difference (Std Err)	p-value (difference=0)
$Underpricing_{Two\text{-}stage\ IPO} - Underpricing_{Traditional\ IPO}$	-0.225 (0.025)	0.01
Return $volat_{Two\text{-}stage\ IPO}$ − Return $volat_{Traditional\ IPO}$	-0.005 (0.0027)	0.07

Panel C. Treatment effects model

C1. First stage

Variables	Coefficient estimates
$Log(Sales_{t-1})$	0.059*
	(1.75)
$Profitable_{t-1}$	-0.127***
	(-3.14)
VC-backed	-1.219***
	(-9.79)
Book leverage $_{t-1}$	-0.762***
	(-4.58)
Cash ratio $_{t-1}$	0.555**
	(2.28)
Tangible assets $_{t-1}$	0.689***
	(2.57)
Investments ratio $_{t-1}$	-0.764
	(-1.53)
Time indicators $_{t-1}$	Yes
Num. Obs.	2,027
Prob χ >0	0.00

C2. Second stage

Dependent variable:	Underpricing		Post-offering return volatility	
	(1)	(2)	(3)	(4)
Two-stage IPO probability	-0.224**	-0.220***	-0.015***	-0.013***
	(-2.53)	(-3.19)	(-5.28)	(-4.30)
$Log(Sales_{t-1})$	-0.006	-0.011**	-0.003***	-0.003***
	(-1.23)	(-1.97)	(-7.42)	(-6.99)
$Profitable_{t-1}$	-0.094***	-0.132***	-0.012***	-0.004
	(-3.54)	(-4.60)	(-10.04)	(-0.47)
Share overhang	0.014	0.027	0.001	0.001
	(0.74)	(1.40)	(1.17)	(1.18)
Reputable underwriter		0.156***		-0.001
		(5.82)		(-0.47)
VC-backed		0.065**		0.004*
		(2.39)		(1.78)
Nasdaq return	1.467**	1.163	-0.003	-0.003
	(2.14)	(1.61)	(-1.04)	(-0.11)
Industry indicators	Yes	Yes	Yes	Yes
Time indicators	Yes	Yes	Yes	Yes
Num. Obs.	2,027	2,027	2,027	2,027
Prob χ >0	0.00	0.00	0.00	0.00

Table 4
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. Post-offering return volatility is the market model root-mean square error for each firm over day +5 to day +64 relative to the offer day. Panel A presents the univariate results. Panel B presents the difference 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 C presents the second stage results of a treatment effects model (Maddala (1983)). Robust *t*-statistics in parenthesis. The symbols ***, **, * represent statistical significance at the 1 percent, 5 percent, and 10 percent, respectively.

Panel A. Univariate analysis

	Number of obs.	Post-offering return volatility	
		Mean	Median
Two-stage IPOs	124	0.047	0.044
Traditional IPOs	1,903	0.049	0.043
Wilcoxon rank-sum test for $Median_{Two\text{-}stage\ IPO} = Median_{Traditional\ IPO}$			
$Z = -0.13$			
$Prob > \|Z\| = 0.89$			

Panel B. Propensity score matching

B1. Covariate balance of two-stage IPOs (Treated) and traditional IPOs (Controls)

		Controls before matching		Controls after matching	
Variable	Mean (Treated)	Mean (Controls)	t-statistic for difference in Means	Mean (Controls)	t-statistic for difference in Means
$Sales_{t-1}$	136.25	133.63	0.03	116.62	0.20
Tangible assets $_{t-1}$	0.27	0.22	2.79	0.24	1.38
$Profitability_{t-1}$	-0.21	-0.28	0.65	-0.36	1.32
IPO year	2008	2001	13.20	2009	-1.52
Book leverage $_{t-1}$	0.20	0.33	2.23	0.26	-1.21
Cash ratio $_{t-1}$	0.29	0.27	0.74	0.33	-1.28
Investments ratio $_{t-1}$	0.23	0.36	-1.70	0.24	-0.19
Num. Obs.	124	1,903		103	

B2. Average treatment effects

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

Panel C. Treatment effects model

Dependent variable:	Post-offering return volatility		
	(1)	(2)	(3)
Upgraded probability	-0.013***	-0.013***	-0.014***
	(-4.19)	(-2.63)	(-2.86)
Amount of disclosure		0.0003	0.0003
		(0.38)	(0.30)
Amount of disclosure^2		-0.000	-0.000
		(-0.81)	(-0.73)
Mandatory disclosure			-0.005
			(-1.21)
Log(Sales$_{t-1}$)	-0.001***	-0.001***	-0.003***
	(-6.08)	(-6.05)	(-9.13)
Profitable$_{t-1}$	-0.012***	-0.012***	-0.012***
	(-9.90)	(-9.88)	(-11.23)
Nasdaq return	-0.023	-0.020	-0.019
	(-0.77)	(-0.69)	(-0.66)
Industry indicators	Yes	Yes	Yes
Time indicators	Yes	Yes	Yes
Num. Obs.	2,027	2,027	2,027
Prob χ >0	0.00	0.00	0.00

Table 5
Uncertainty at the time of upgrade – Upgrades

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 upgraded firms without subsequent equity offering (Upgrades). Post-offering return volatility is the market model root-mean square error for each firm over day +5 to day +64 relative to the offer day. Panel A presents the univariate results. Panel B presents the difference between the underpricing and return volatility of upgrades and that of a control sample of IPO firms selected based on propensity score matching. Panel C presents the second stage results of a treatment effects model (Maddala (1983)). Robust *t*-statistics in parenthesis. The symbols ***, **, * represent statistical significance at the 1 percent, 5 percent, and 10 percent, respectively.

Panel A. Univariate analysis

	Number of obs.	Post-offering return volatility	
		Mean	Median
Upgrades	183	0.050	0.045
Traditional IPOs	1,903	0.049	0.043
Wilcoxon rank-sum test for $Median_{Upgrades} = Median_{Traditional\ IPO}$			
$Z = 0.77$			
$Prob > \|Z\| = 0.44$			

Panel B. Propensity score matching

Variable of interest	Num. obs.	Difference (Std Err)	p-value (difference=0)
Average treatment effect – Full sample			
Return $volat_{Upgrades}$ – Return $volat_{Traditional\ IPO}$	183	0.003 (0.004)	0.44
Average treatment effect – firms in top quartile of disclosure			
Return $volat_{Upgrades}$ – Return $volat_{Traditional\ IPO}$	46	-0.012 (0.003)	0.01
Average treatment effect – firms in lowest quartile of disclosure			
Return $volat_{Upgrades}$ – Return $volat_{Traditional\ IPO}$	48	0.005 (0.004)	0.22

Panel C. Treatment effects model

Dependent variable:	Post-offering return volatility		
	(1)	(2)	(3)
Upgraded probability	-0.008***	-0.011***	-0.011***
	(-2.61)	(-2.66)	(-2.69)
Amount of disclosure		0.000	0.000
		(1.65)	(1.61)
Amount of disclosure^2		-0.0001**	-0.0001**
		(-2.06)	(-2.02)
Mandatory disclosure			-0.002
			(-0.44)
Log($Sales_{t-1}$)	-0.002***	-0.002***	-0.002***
	(-5.54)	(-5.60)	(-5.61)
$Profitable_{t-1}$	-0.011***	-0.011***	-0.011***
	(-10.07)	(-9.98)	(-9.98)
Nasdaq return	-0.013	-0.015	-0.015
	(-0.43)	(-0.50)	(-0.52)
Industry indicators	Yes	Yes	Yes
Time indicators	Yes	Yes	Yes
Num. Obs.	2,086	2,086	2,086
Prob χ >0	0.00	0.00	0.00

Table 6

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. 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). The offering document at the time of OTC listing is an 8-K, and that at the time of first public equity offering it is an S-1. Panel B lists the median PIPE discounts of two-stage IPOs and upgrades for their first PIPE transaction following the quotation on the OTC market, and the first PIPE transaction after their upgrade to a national exchange (NYSE, NASDAQ, or AMEX) but before any public equity offering. Discounts are measured as a percentage of the offer price on the private offering issue date.

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
% Uncertainty $_{\text{OTC listing}}$	54	3.10%	3.15%
% Uncertainty $_{\text{First equity offering}}$	54	2.95%	2.27%

Wilcoxon rank-sum test for $\text{Median}_{\text{OTC listing}} = \text{Median}_{\text{First equity offering}}$

Z = 1.96

Prob > |Z| = 0.05

Wilcoxon signed-rank test for $\text{Median}_{\text{OTC listing}} = \text{Median}_{\text{First equity offering}}$

Z = 2.10

Prob > |Z| = 0.05

Panel B. Changes in private offering discounts from time of OTC market quotation to the upgrade on a national exchange

	Number of obs.	Median
PIPE discount $_{\text{OTC listing}}$	79	15.8%
PIPE discount $_{\text{National exchange listing}}$	143	7.7%

Wilcoxon signed-rank test for PIPE discount $_{\text{National exchange listing}}$ = PIPE discount $_{\text{OTC listing}}$

Z = -3.05

Prob > |Z| = 0.01

Table 7
Institutional investor participation in two-stage IPOs and traditional IPOs

This table presents the institutional investor ownership in two-stage IPOs and traditional IPOs during the period 1996-2013. Institutional ownership is measured in the four quarters prior to and after the upgrade to a national exchange (for two-stage IPOs) or the IPO (for traditional IPO). The symbols ***, **, * represent statistically significant differences between two-stage IPOs and traditional IPOs at the 1 percent, 5 percent, and 10 percent based on nonparametric Mann-Whitney test for equality of medians.

Quarter	Two-stage IPOs Mean (Median)	Traditional IPOs Mean (Median)
-4	20% (11%)	-
-3	20% (10%)	-
-2	21% (12%)	-
-1	18% (10%)	-
1	16% (6%)	25% (21%***)
2	17% (7%)	29% (26%***)
3	17% (7%)	34% (31%***)
4	17% (7%)	38% (35%***)

Table 8
Time to first analyst coverage

This table presents the results of a Cox proportional hazard model for the time to first analyst coverage. The sample includes two-stage IPOs, upgrades and traditional IPOs that have analyst following data on I/B/E/S. The time to first analyst coverage is defined as the number of days from the initial date of listing to the date of first analyst earnings forecast. The initial date is the IPO offer for traditional IPOs and the date of upgrade to a national exchange for the subsample of two-stage IPOs and upgrades. For firms that have analyst following prior to IPO/upgrade we set our dependent variable, the time to analyst coverage, equal to zero All control variables are defined in the *Appendix*. Hazard ratios are reported in the table, with z-values in parenthesis.

Dependent variable:	Time to first analyst coverage	
	(1)	(2)
Upgraded	0.823**	0.488***
	(-2.41)	(-7.16)
$Log(Sales_{t-1})$		1.063***
		(5.36)
$Profitable_{t-1}$		0.951**
		(-2.19)
R&D		1.000
		(0.35)
Missing R&D dummy		0.921
		(-1.32)
Industry indicators	No	Yes
Time indicators	No	Yes
Num. Obs.	1,916	1,916
Prob χ >0	0.01	0.01