First Draft: June 10, 2013
This Draft: August 28, 2013

Do Firms Get What They Pay For? A Second Thought on Over-Allotment Option in IPOs[§]

EMANUELE BAJO*

MASSIMILIANO BARBI*

GIOVANNI PETRELLA**

Abstract

An over-allotment option (OAO) usually complements an IPO to meet any excess demand and provide underwriters with an incentive to stabilize stock prices in the aftermarket. However, this clause also represents an additional source of compensation to the bank syndicate and, consequently, the issuer is entitled to expect tangible benefits from its inclusion in the IPO. In this paper we provide both an estimate of the value of the OAO and a comprehensive evidence of its effect on underwriting fees, IPO underpricing and price stabilization. Contrary to the theoretical predictions, we find that the OAO (a) does not reduce the underwriting fees, (b) does not moderate the IPO underpricing, and (c) does not increase the aftermarket stabilization. Our results cast a shadow on the real benefits of this clause from the perspective of the issuing firm.

JEL Classification: G14; G32.

Keywords: Over-allotment Option; IPO; Stabilization; Underpricing.

---

* University of Bologna, Department of Management, via Capo di Lucca 34, 40126 Bologna, Italy. ** Catholic University, largo Gemelli 1, 20123 Milano, Italy. Corresponding author: Emanuele Bajo, email address: emanuele.bajo@unibo.it.

§ The authors would like to thank Giulia Baschieri, Andrea Carosi, Fabrizio Palmucci, Pierpaolo Pattitoni, Barbara Petracci and Lucio Picci for useful comments and suggestions.

1 Introduction

The over-allotment option (OAO) gives the underwriter in an initial public offering (IPO) the right to acquire additional shares from the issuing firm at the offer price minus the underwriting fee. This clause — also known as *green shoe*[1] — enables the underwriter to meet any excess demand for an issue and, concurrently, provides her with an additional source of revenue. The underwriter may, in fact, oversell the offer and cover the short position with a positive profit, no matter how the stock price performs in the open market. If the stock price falls, when secondary market trading begins, the underwriter covers the short position through market purchases. Alternatively, if the stock price rises, the underwriter exercises the OAO and increases her revenues through additional underwriting fees.

Nowadays, the OAO is a standard clause that appears in the prospectuses of almost all equity issues around the world. Notwithstanding its widespread use, little research has been devoted to explore the incentives and the effects of such a clause. Exceptions are the papers by Hansen *et al.* (1987) and Carter and Dark (1990) on US market, Chung *et al.* (2000) on Canadian IPOs, and Franzke and Schlag (2002) on Germany Neuer Markt IPOs.[2]

---

[1] The name originates from the first company using this clause, i.e. Green Shoe Manufacturing, now Stride Rite Corporation.

[2] Hansen *et al.* (1987) analyse a sample of 147 and verify (a) whether the inclusion of the OAO affects the flotation cost, i.e. underwriter spread, underpricing and aftermarket performance, and (b) the characteristics of IPO firms which are more willing to grant a higher stake of over-allotted shares. They find that the quantity of over-allotted shares increases with the riskiness of the firm and decreases with its size. However, they find no differences in terms of flotation cost for the sub-sample of SEOs reporting no OAO. Since the option is costly to the issuing firm, they conclude that firms use it to avoid the higher gross spread they would be required to pay in the absence of this clause (reneging insurance hypothesis). Carter and Dark (1990) analyse a sample of 483 IPOs between 1979 and 1983 and confirm that underwriter fees do not decline with the increase in the relative size of OAO (i.e., OAO shares as a fraction of total shares offered). They also document a positive (negative) relationship between the use of OAO and the firm's riskiness (underwriter reputation). These findings motivate the authors to suggest a complementarity rationale between reputation and OAO. As discussed in Chemmanur and Fulghieri (1994), more reputable underwriters avoid riskier IPOs in order not to squander their reputational capital due to large ex-post mispricing. A possible way to manage the value uncertainty without the support of highly reputable underwriters is to create a short position (over-allocation), and cover it through aftermarket purchases at no cost. This strategy is affordable only if the OAO is granted. More recently, Chung *et al.* (2000) investigate the role of the OAO in 463 Canadian IPOs between 1984 and 1993, and

Hansen *et al.* (1987), interpreting the OAO as a call option, quantify its value as roughly 1 percent of the IPO proceeds regardless of the offer size. In this study, we obtain an even higher estimate of the option value, approximately equal to 1.5 percent of the proceeds. The motivation for our study is triggered by the apparent contradiction between the clear advantage offered by the OAO to the underwriter and uncertain positive effects to the issuing firm.

Despite these few studies, we still lack a comprehensive investigation of the real benefits for the issuing firm in return of granting the OAO. In this paper we precisely aim at rationalizing the theoretical underpinnings and the actual effects of OAO. We provide several empirical tests in order to understanding whether the use of this clause generates real benefits for the issuing firm or simply represents an economic rent for the investment banking industry. From a theoretical viewpoint, we might expect that the OAO reduces the underwriting fees (*substitution effect*), moderate the IPO underpricing (*price upward incentive*) and increase the aftermarket stabilization (*short position incentive*). The rationale for these relationships is the following. First, since the option is an important source of compensation, the underwriter might be more willing to either lower the gross spread or, equivalently, avoid raising it when the issuing firm is smaller and riskier. Second, the combination of a short position and the over-allotment (call) option provides the underwriter with a put option that in turns results in an economic incentive to increase the offer price, thus reducing the expected underpricing. Third, the OAO makes it profitable to cover the short position in the open market when the stock price drops. Accordingly, this option represents a natural incentive for price stabilization. However, based on a sample of 6,814 US IPOs in the period 1983-2007, we find none of these expected effects being actually in place. Our results on underpricing and flotation costs are consistent with the evidence emerged from earlier IPO studies. Instead, the lack of higher stabilization effort contradicts the prevalent beliefs based on anecdotal evidence. These findings, taken together, support the thesis that underwriters have steadily been more and more successful in convincing firms to grant the OAO (which has thus become a

---

find a less frequent use of this clause relative to the US market, a modest increase in the likelihood of aftermarket stabilization and a positive correlation between the presence of OAO and underwriting fees. Franzke and Schlag (2002) examine a sample of 352 IPOs on the German market and document that inclusion of the OAO has virtually no effect on price stabilization or aftermarket performance.

standard clause in IPOs) without giving in return any real benefit to the firm. Our results imply that the actual underwriting compensation is higher than the one usually reported by only considering the gross spread, and – once the value of the OAO clause is taken into account – it increases to roughly 8.5 percent, against the 7 percent, as documented by Chen and Ritter (2000).

The remainder of the paper is structured as follow. Section 2 describes the mechanics and value of the over-allotment option. Section 3 presents the theoretical arguments supporting the use of this option, in the view of the issuing firms. Section 4 describes our sample and presents the summary statistics. Section 5 documents the firms' characteristics which are more likely associated to the presence of the OAO, and the impact of this clause on gross spread, underpricing and aftermarket stabilization. Section 6 presents a number of robustness checks to verify the soundness of our empirical results. Section 7 concludes the study.

2 Mechanics and value of the over-allotment option

The OAO allows the underwriter to over-allocate the offer — up to 15 percent of the registered shares — borrowing the additional shares from the issuer. At the same time, the underwriter has also the option to purchase from the issuer the over-allocated shares at a predetermined price (offer price net of gross spread) and within a given period (usually, thirty days). Hence, the presence of an OAO in the hands of the lead underwriter turns in a short position to be covered once the shares begin to be traded in the aftermarket. However, the underwriter has the right, but not the obligation, to cover her position *via* the option exercise, that is buying back the shares from issuer. The alternative strategy is purchasing the over-allotted shares directly in the open market. Since the green-shoe allows to buy the shares from the issuing company at the offer price minus the spread, the underwriter will obtain a minimum profit equal to this fee if the stock price goes up, benefitting from a possible greater profit if the stock price declines. The OAO — like any option — has a value and, therefore, potentially affects the underwriter decisions.

Please insert Figure 1 about here

The standard mechanics underneath the OAO can be illustrated with the following example (Figure 1). The lead underwriter has the commitment to allocate 100 shares at an offer price of $10. As a compensation for her service the market practice is that she receives a 7 percent gross spread. Thus, the underwriter buys the shares at $9.30 (i.e., the offer price minus the spread) from the issuing firm and allocates them to the public at $10 (the offer price). On top of the issued shares, the underwriter is allowed to over-allot — in case of high demand — up to 15 percent of the offer, that is 15 shares. The dashed line in Figure 1 shows the short position of the underwriter, since she profits (loses) in the event of a price reduction (increase). However, thanks to the associated green-shoe, when the stock price rises the underwriter is allowed to buy the over-allotted shares from the issuing firm at the offer price minus the spread. This right is a long call option (dotted line). As a result, the combined short position on the stock plus the call option translates into a long put option (solid line), and the underwriter gets a fixed sum equal to the 7 percent of the over-allotted shares plus the put option payoff.[3] For this reason, the OAO (the solid line in Figure 1) represents an additional compensation for the underwriter despite this source of revenue has been mostly ignored in the literature.

The OAO provides the underwriter with a minimum compensation in the event of a price increase (i.e., the gross spread on the over-allotted shares). If the underwriter allocates the OAO in full (15 percent of the offer), this floor amounts to 1.05 percent (7 percent of 15 percent) of the proceeds. When the market price declines below the strike price, the underwriter can increase her profit by covering the short position at the (lower) market price. The combined position yields a payoff equal to the floor (1.05 percent) plus a put option with a strike price set at the offer price minus the spread. Based on the Black and Scholes (1973) formula,[4] we estimate the value of

---

[3] Hansen et al. (1987) interpret the green-shoe as a call option held by the underwriter and, applying the Black and Scholes pricing model, they value it approximately 1 percent of the IPO proceeds, regardless the size of the offer. Fishe (2002) suggests the same interpretation, but also mentions that the combination with the short position produces a long put.

[4] This estimate is based on our sample, which is described in Section 4. The value of each option is estimated using the following parameters: 30-day time-to-maturity, zero risk-free interest rate, 30-day aftermarket volatility and strike price equal to the offer price minus the gross spread.

the OAO to about 1.5 percent of the total proceeds. The put option value accounts for approximately 30 percent of this sum (0.45 percent of the total 1.5 percent).[5]

3 The rationale of the over-allotment option

Granting the over-allotment option (OAO) is nowadays a standard practice in the IPO industry. However, no previous research has stressed how expensive this option is for the issuer and what are the real benefits (if any) to the issuer. Chen and Ritter (2000) and Abrahamanson and Jenkinson (2011) show that the "7 percent solution" has become prevalent for US IPOs. However, this figure understates the real cost of going public, which is roughly 8.5 percent of the IPO proceeds, once the OAO is taken into account. Since the OAO provides the underwriter with a non-negligible additional source of revenues, on top of the standard 7 percent, it should be rational to grant it only in exchange for a real benefit to the issuing firm.

The aim of this Section is to show, through a simple model, that the inclusion of the OAO should — from a theoretical standpoint — yield some benefits to the issuing firm thanks to the incentives generated over the underwriter. First, the gain resulting from covering the short position induces the underwriter to engage herself in the aftermarket stabilization activity. Second, the OAO encourages the underwriter to settle for a higher offer price, thus reducing the expected underpricing. Lastly, in terms of gross spread, the underwriter might be willing to accept a slight decrease on her monetary compensation, as this could be offset by the additional source of revenues guaranteed by the OAO. Our model provides some testable hypotheses, which will be subject to empirical validation in Section 5.

---

[5] We are aware that the Black and Scholes formula would not be adequate, since (a) the option style is American, and (b) the actual distribution of stock returns in the few days after the IPO does not match the normal distribution because highly skewed (see Asquith *et al.*, 1998).
We also attempt to value the OAO directly based on our data, i.e. measuring the effective (ex post) gain if underwriters were to cover the short position rationally, meaning through the exercise of the green-shoe in the event of market price above the strike price and with purchases in the open market otherwise. Taking into account the observed trading volumes (that is, excluding the possibility for the underwriter to trade more than the shares available in the market), the effective gain is about 1.44 percent of the proceeds. Conditionally to the convenience of carrying out open market purchases (32.9 percent of our observations), the effective gain rises to 1.86 percent.

3.1 The set up

To model the implications of the OAO on the abovementioned variables, we assume that the underwriter's goal is to maximize her expected monetary profit in a two-period set up. At time $t = 0$ the underwriter agrees with the issuing firm on the offer price (p) and the gross spread (s) that will be applied to the deal. At time $t = 1$ the new shares trade in the open market, and the stock price (p_1) becomes known to investors. Denoting with N the number of offered shares and with α the fraction of over-allotted shares, the monetary profit to the underwriter is given by

$$\Pi = Nps + \alpha Nps 1_{p_1 \geq p(1-s)} + \alpha N(p - p_1) 1_{p_1 < p(1-s)}, \quad (1)$$

where 1_C denotes the indicator variable which takes the value of 1 if the condition C is verified, and 0 otherwise. Taking the expectation of the expression in equation (1) yields:

$$\mathrm{E}(\Pi) = Nps + (1 - \pi)\alpha Nps + \pi\alpha N\big(p - E(p_1|A)\big), \quad (2)$$

where $\pi = \mathrm{prob}(p_1 \in A)$, and $A = \{p_1 < p(1 - s)\}$. According to equation (2), the underwriter expected profit can be split up into three parts: (a) the monetary gross spread paid by the firm on the N shares which compose the "regular" part of the offer, that is Nps; (b) the monetary gross spread on the part of the offer which the underwriter has over-allotted and buys back through the exercise of the green-shoe, weighted by the probability that the stock price exceeds the offer price, i.e. $(1 - \pi)\alpha Nps$; (c) the monetary profits on the over-allotted shares in case they are bought on the market at a price lower than the net offer price (and which is, by definition, greater than the monetary gross spread on the same shares), weighted by the probability that the stock price falls below the offer price, i.e. $\pi\alpha N\big(p - E(p_1|A)\big)$. Alternatively, if the underwriter is granted no OAO, she simply maximizes her expected profit and chooses an offer price and a gross spread, (p', s'), to obtain:

$$\mathrm{E}(\Pi') = Np's'. \quad (3)$$

The difference between the expected profit to the underwriter with OAO (equation (2)) and without OAO (equation (3)), $\mathrm{E}(\Delta\Pi)$, can be written as:

$$\mathrm{E}(\Delta\Pi) = N(ps - p's') + \alpha N\Big((1 - \pi)ps + \pi\big(p - E(p_1|A)\big)\Big). \quad (4)$$

The expression in equation (4) can be investigated taking the stock price in the aftermarket, p_1, as exogenous, and analysing the effect of a shift in the other relevant parameters.

3.2 The incentive over stabilization

One of the most important services that the underwriter offers to the issuing firm is the aftermarket price stabilization. During the first trading days, if the stock price declines, the underwriter places bids in the market and provides price support. The stabilization carried out by underwriters in IPOs has been widely documented in the literature. According to Aggarwal (2000), the activity of price support of underwriters is typically accomplished through an initial negative inventory and the selective exercise of the OAO. Ellis *et al.* (2000) document that the use of institutional mechanisms, such as the OAO, helps underwriters to reduce their inventory risk, stressing that price support is a relatively profitable activity. Fishe (2002) develops a model in which the underwriter reacts to stock flippers shorting the issue and repurchasing the stocks in the aftermarket. While the purpose of the underwriter is to maximize her own profits and penalizing the flippers, at the same time she also provides price stabilization. Lewellen (2006) finds that underwriters accumulate a large negative inventory in cold IPOs on the first day of trading because of their stabilization activity. Boehmer and Fishe (2004) provide a clinical study of one of the largest US IPOs and document, based on tick-by-tick data, that the lead underwriter provides price support and entirely covers his 15 percent short position both through partial exercise of the green-shoe and buying shares in the open market. Also, the underwriter is more likely to intervene in the aftermarket when price declines, thus profiting more than simply exercising the over-allotment option during price run-ups.

Based on the previous studies it is evident that the first and probably most cited benefit for granting the OAO to the underwriter originates from the stabilization incentive. Due to the presence of the green-shoe, the lead underwriter starts his own position on the newly traded shares with a negative inventory. This short position is then gradually reduced in the open market, as the underwriter puts into place stabilizing bids. If the stock price declines, then the underwriter covers her short inventory purchasing shares directly at market price. On the contrary, if the stock price rises, the stabilization activity is no longer necessary, and the

underwriter covers his short position through the exercise of the green-shoe, buying additional shares from the issuing firm at the offer price minus the agreed spread. In both cases, for the amount of shares covered by the green-shoe clause, there is no price risk to the underwriter, and a potential source of profit.

The economic rationale of stabilization is evident if we observe equation (4). Once the IPO has been completed and the stock trades in the open market, the information asymmetry on the firm prospects diminishes and it can be assumed that the stock trades, on average, at its fair price. However, from an *ex-ante* perspective, p_1 is uncertain, and the greater its variance, (a) the larger the potential profit to the underwriter deriving from the difference between the offer price and the stock price in the aftermarket, $p - E(p_1|A)$, and (b) the more likely the stock price in the open market will fall below the offer price itself, i.e. π. Both these effects imply a greater differential profit to the underwriter when the OAO is present.[6] It is also true that greater variability means as well that the stock price can greatly exceed the offer price, but in this case the underwriter receives a constant payoff equal to the monetary gross spread on the fraction of over-allotted shares. Therefore, a more active stabilization activity should be observed when the underwriter is granted the option to over-allot shares, as she both covers her short position by buying shares in the open market and profits from the price support activity.

3.3 The incentive over optimal underpricing

Another widely investigated phenomenon is IPO underpricing. In spite of the progressive reduction of this trend, as Loughran and Ritter (2004) document, lead underwriters generally set the offer price below its equilibrium level, so to generate the typical positive first day return. Among the possible motivations suggested in the literature, the most accredited explanation is associated with asymmetric information, as Rock (1986) suggests the "winner's curse" problem. Since it is hard to predict the quality of an IPO, uninformed investors expect to receive excessively large allocation of overpriced IPOs, and smaller stake in underpriced issues. In order to guarantee their participation to the IPO market — and the existence of the market itself — some degree of underpricing is needed. The presence of

[6] From Figure 1 it is clear that higher volatility increases the value of the resulting put option, leaving the fixed component unaffected.

underpricing is also obviously seen very favorably by the underwriter. Since she guarantees the full allocation of the issue, the risk of not being able to sell the shares to the public lessens if the offer price is set below the fundamental value. Moreover, the underwriter benefits from underpricing as she can allocate undervalued shares to institutional investors participating to the bookbuilding. This in turn fuels the cooperative attitude of the institutional investors who are more willing to disclose their reservation prices and help price discovery (Benveniste and Spindt, 1989; Spatt and Srivastava, 1991; Cornelli and Goldreich, 2003). Along this stream, Hanley and Wilhelm (1995) and Aggarwal *et al.* (2002) document that institutional investors receive significant allocation in underpriced IPOs, while Chemmanur *et al.* (2010) show that institutional allocation sales are highly profitable, allowing them to fully realize the money left on the table. Lastly, allocating underpriced shares reduces the risk of observing negative first days return, that would harm the underwriters' reputation (Beatty and Ritter, 1986) and obligate them to undertake costly aftermarket price stabilization activities (Aggarwal, 2000).

The presence of the OAO can marginally reduce the underwriter's incentive to set the offer price significantly below the equilibrium level. In our model, the differential expected profit in equation (4) can be investigated as a function of the offer price, p, taking all other parameters as given. Hence, we compute the sensitivity of the expected differential profit to the change in the offer price, Δp, i.e.

$$\Delta \mathrm{E}(\Delta \Pi)/\Delta p = Ns + \alpha N\big((1-\pi)s + \pi\big) + \alpha N \frac{\Delta \pi}{\Delta p}\Big(\big(p - E(p_1|A)\big) - ps\Big) \qquad (5)$$

This derivative is always positive, since $\Delta\pi/\Delta p > 0$, i.e. the higher p the higher the probability for the underwriter to cover her short position with direct purchases in the open market, and $p - E(p_1|A) > ps$ as the expected profit per share from covering the naked position in the open market is greater than the gross spread per share. Equation (5) can be interpreted as follows: the incremental expected profit generated by the OAO derives from (a) the marginal gross spread on the monetary value of the "regular" offer (first term), (b) the additional gross spread on the over-allotted shares (second term), (c) the higher gain from covering the naked position in the open market instead of exercising the over-allotment option, weighted by the increased probability that the stock price falls below the net offer price (third term).

It might be argued that the underwriter does not maximize the profit function expressed by equation (5), but rather she considers a long-run objective function that includes other variables only indirectly related to monetary measures. Some of these non-monetary goals certainly have a negative effect over the optimal (for the underwriter's point of view) level of offer price. For instance, the underwriter might be concerned about the potential reputational damage resulting from an overpriced issue. Also, a less underpriced issue would diminish the reward for the institutional investors participating to the bookbuilding. We acknowledge the existence of these effects acting in the opposite direction of the OAO in setting the offer price too far from the level the underwriter would have chosen if the issuer did not grant any OAO. However, *ceteris paribus*, the presence of the OAO would provide an incentive for the bank to set an higher offer price, thus reducing the expected underpricing.

3.4 The incentive over gross spread

Hansen *et al*. (1987) and Carter and Dark (1990) test whether the inclusion of the OAO has any effect on the gross spread paid to the underwriter, finding no evidence of this relation. From a theoretical standpoint, according to equation (4), the effect of a change in the gross spread, Δs, on the expected differential profit is given by the following expression:

$$\boldsymbol{\Delta E(\Delta \Pi)/\Delta s = Np + \alpha N(1-\pi)p + \alpha N \frac{\Delta \pi}{\Delta s}\Big(\big(p - E(p_1|A)\big) - ps\Big)} \qquad (6)$$

The inclusion of the OAO does not induce the underwriter to set a lower gross spread, as equation (6) is not decreasing in s. However, since $\Delta\pi/\Delta s < 0$, a substitution effect between the gross spread earned on the N allotted shares and the expected profit from buying back the αN shares at a price lower than the offer price might exist. According to our estimates, the OAO is approximately worth 1.5 percent of the IPO proceeds, i.e. roughly 20 percent of the total amount paid by the issuer to the investment banks composing the syndicate for management, underwriting and selling services. Since this amount is substantial, it can be argued that the issuer would be reluctant to grant the option unless he foresees a clear benefit. In other words, the issuer could trade the OAO for a reduction in the gross spread, implying some kind of substitution effect between the two components of the IPO cost. The underwriter would receive the same (or even a

larger) profit despite the lower spread, because of the additional compensation arising from the OAO. This conclusion might be empirically confuted as Chen and Ritter (2000) and Abrahamson and Jenkinson (2011) document a cluster of IPO spread around 7 percent, and hence little variability of this component of the IPO cost. However, riskier firms or smaller IPOs, which are more likely to depart from the "7 percent solution", might be more willing to grant the OAO, should this help to keep the gross spread to the "standard" 7 percent level.

4 Sample and descriptive statistics

We collect data on security offerings from the New Issues Database of the Securities Data Company (SDC). We include issues marketed in the United States from August 1983 to December 2007.[7] Offerings of closed-end funds, American depositary receipts (ADRs), real estate investment trusts (REITs), unit offerings, and competitive bid offerings are excluded. We also exclude a small number of offerings with missing data on OAO. This produces a base sample of 6,814 IPOs. All monetary figures are expressed in dollar amounts as of December 2007. We use CRSP for data on stock prices and trading volumes.

The main variable of interest in our empirical analysis is the inclusion of the OAO in the IPO prospectuses. We obtain this information from SDC. The distribution of IPOs across the period under analysis and the frequency of inclusion of the OAO are displayed in Figure 2.

Please insert Figure 2 about here

The width of each rectangle identifies the proportion of IPOs relative to the full sample in that particular year. Each rectangle is also split into three segments to distinguish the fraction of offers reporting no over-allotment (green segment), the maximum allowed amount, i.e. 15 percent (blue segment), and any level between these thresholds (red segment). In terms of IPOs distribution, Figure 2 clearly shows two different waves occurred over the period under investigation. The first

[7] Our sample period starts after the National Association of Securities Dealer (NASD) – now known as the Financial Industry Regulatory Authority (FINRA) – relaxed its limit on the level of OAO, increasing the former 10 percent maximum amount to 15 percent of the offered shares.

peak occurred towards the end of the ’80s, followed by a slight decline before the second run-up that took place during the ’90s, broken by the dot.com bubble that dampened the number of issues in the last decade. To our purpose, however, the inspection of the vertical breakdowns of the rectangles is undoubtedly more insightful. Figure 2 shows the progressive increase on the use of the OAO. While in the ’80s about three out of four offers were granting the maximum level of OAO to underwriters, from the mid-’90s the proportion rose up to roughly 90 percent. Over the same time period, the proportion of IPOs exhibiting no over-allotment at all fell from 10 percent on average to nearly disappearance. These figures confirm that the inclusion of the OAO — that has been always very popular in US IPOs — has become a common practice in the industry, despite its actual benefits for the issuer lack any sound empirical investigation, being just grounded on anecdotal evidence.

Table 1 presents summary statistics for our sample, distinguishing between offers including and not including the OAO.

Please insert Table 1 about here

The last two columns report the mean and median difference between the two groups, along with their statistical significance. Focusing on the main variables under investigation, Table 1 provides early evidence against the three theoretical benefits for the issuing firms. While acknowledging the obvious limit of looking at univariate statistics, we note that the inclusion of the OAO is related to (a) higher gross spread, (b) more pronounced underpricing, and (c) lower stabilization. These results are completely at odd with respect to the theoretical motivations for the issuer to grant the OAO to the underwriter. In fact, the sub-sample of deals containing the OAO exhibits a gross spread almost 1.0 (0.50) percentage points greater in mean (median) relative to the sub-sample without this clause. Moreover, offers with OAO are associated with an 8.1 (5.4) percentage points higher underpricing in mean (median). Finally, no-OAO granting issuers seem to benefit more from price stabilization (+6.3 percentage points in the average frequency). Needless to say, this first evidence needs to be corroborated by the multivariate analysis in the next Sections, as it can be affected by the cross-sectional characteristics of the issuing firms.

Table 1 also provides information on the firm's characteristics, showing that significant differences exist between the two sub-samples. Offers including the OAO are generally smaller, as these IPOs raise in mean (median) $86 ($52) million less and we draw the same conclusion if we look at the firm's size (measured both at book and market value). The difference in size alone could partially explain the evidence on gross spread. Given the economies of scale in the IPO business, the higher gross spread associated with offers including the OAO could be the result of the limited size of the issue, rather than deriving from the option granted to the underwriter. Risk profile is another characteristic exhibiting a significant difference. Firms granting the OAO are on average 9 years younger and they are taken public by less reputable underwriters (the value of the Carter-Manaster reputation measure is 8 *vs.* 9 for the no-OAO sample). Also, they are more likely to belong to a tech industry (the dummy difference is about 14 percent), to be listed at NASDAQ (dummy difference about 32 percent), to have a lockup clause (dummy difference about 63 percent) and to be venture-backed (dummy difference about 20 percent). All these differences suggest that firms granting the OAO are riskier than firms not granting the OAO. This result can also drive some of the preliminary findings reported earlier. In particular, a higher gross spread and a more pronounced underpricing could be the consequence of the higher risk associated with the type of firms included in the sub-sample of firms granting the OAO.

Turning to the characteristics of the offer, we note that OAO firms show higher filing range and lower overhang, measured as the ratio between the number of pre-IPO shares divided by the number of issued shares, indicating that firms granting the option exhibit more price uncertainty and retain a smaller fraction of shares after the IPO. Firms granting the OAO are also 36 (5) percent more likely to be covered by an (all star) analyst in the aftermarket, which may contribute explaining the higher spread, but they are also characterized by lower aftermarket liquidity (measured by turnover) and higher 30-day volatility. Finally, IPOs with OAO have taken place during periods of higher market volatility (Pre-IPO Market Volatility) and greater average underpricing (IPO Returns). Specifically, the mean (median) underpricing for the sample of IPO with overallotment is 20.1% (13.6%), against 13.3% (10.1%) for the opposite sample. The standard deviation of the market index the month prior to the IPO is 3.4% (1.8%) higher for the sample of IPOs with overallotment.

5 Empirical analysis

Based on the theoretical predictions presented in Section 3, the rationales for the use of the OAO are threefold: (a) reducing the cost of the IPO, (b) lowering the underpricing of the issue, and (c) providing the underwriter with an incentive to support the stock price in the aftermarket. Given the substantial value of this option, the issuing firm is likely to expect a non-negligible benefit in return. This Section aims at testing whether any of the above-mentioned effects is indeed in place, controlling for firm- and offer-level characteristics that are more likely associated with the presence of the OAO.

5.1 The use of the OAO

As we have documented earlier, the use of the OAO has become more and more common in the industry. The inclusion of the over-allotment clause has become nearly automatic, without any negotiation process between the underwriter and the issuer. Since the OAO is costly to the issuing firm, the steady increase of its use either suggests that over the years the benefits for the issuers have become evident, or that the underwriter's bargaining power has risen up to a level where no firm questions its inclusion. On top of the previous motivation, as IPO firms might not be fully able to assess the actual value of the granted option, the underestimation of this value may help explaining the widespread use of the OAO clause. While the investigation of the potential benefits for the issuer will be the subject of the next three sub-Sections, in this sub-Section we aim instead at understanding the propensity of IPO firms to grant the overallotment option to the underwriters.

Please insert Table 2 about here

Table 2 reports the regressions estimated to investigate the factors explaining the inclusion of the OAO. In order to examine the firm- and offer-level characteristics associated with the presence of this clause, we run logit and multinomial ordered logit regressions. In the first three models we use a dichotomous variable (*Oaoyes*) to designate deals reporting this clause. The second set of regressions (models from

4 to 6), instead, employs a trichotomous variable taking values of 0, 1 and 2 for the cases of OAO equal to 0, lower than the 15 percent, and equal to 15 percent, respectively.[8] All models control for year-effects, given that the propensity to use this clause increased over time. The results of all regression models are similar. The size of the offer is an important determinant of the decision to grant the OAO, as the presence of this clause is more likely to be associated with smaller IPOs. This finding, which also emerged from the descriptive statistics, is consistent with the bargaining power hypothesis. Larger firms, which presumably can attract the interest of a higher number of underwriters, tend to be more reluctant to grant the option. This result contradicts Benveniste and Wilhem's (1990) argument, according to which the OAO is a two-stage allocation mechanism aimed at facing the demand uncertainty through the allocation of the additional 15 percent only in the event of a hot offer, thus to avoid supplying the market with excess shares. IPO market should be less able to absorb larger offers and therefore we should observe a positive relationship between the offer size and the inclusion of the OAO. The opposite evidence, that we find in our sample, is instead consistent with the following possible explanation: as most of the gains from the OAO derive from covering the naked position in the aftermarket (rather than exercising the *green-shoe* option), expected cold IPOs should more likely present the over-allotment clause. Following this intuition, smaller IPOs — generally less known to the retail investors and less covered by media and analysts — are less able to attract a vast market interest and thus more likely to add the OAO in their prospectuses.

The inclusion of the OAO is also related to the risk of the issuing firm. We find a positive effect of the dummy lockup and — though more moderate — of the tech dummy. These findings seem to suggest a possible role of the option as an incremental compensation to the underwriter in exchange for the higher level of risk. The positive relationship with the number of co-managers suggests a similar conclusion, as the larger is the syndicate the higher is the cost for the issuing firm or — as a result of a substitution effect — the inclusion of the OAO in the hands of the underwriters. We also notice that the underwriter's reputation has no influence

[8] The use of dichotomous or trichotomous variables is justified by the high level of clustering of the variable that accounts for the percentage of allowed over-allotment. With the exception of a negligible fraction of issues, underwriters are usually allowed to over-allocate up to 0, 10 or 15 percent of the offered shares. In that sense, the trichotomous variable equates 1 essentially when the OAO is set at 10% level.

over the inclusion of the OAO. This result is unexpected as reputable underwriters, having more bargaining power, might be in the position to force the issuing firm to grant the OAO as a precondition for taking the firm public. However, empirical findings provide no support to this conjecture.

5.2 The effect on IPO gross spread

The logit analysis in the previous sub-Section showed a positive effect of the firm's riskiness and the number of co-managers on the presence of the OAO, suggesting a possible substitution effect between the standard IPO compensation for the underwriters (i.e., the gross spread) and the OAO. According to the hypothesis stated in Section 3, the underwriter might be willing to accept a small reduction on the spread, in exchange for the additional compensation in the form of the OAO.[9]

Please insert Table 3 about here

Table 3 reports the results of an OLS regression with the IPO gross spread as the dependent variable. As in the previous sub-Section, the presence of the OAO is measured through both a dummy variable (*Oaoyes*) and the multinomial variable (*Oao Class*) taking values of 0, 1 and 2 depending on the percentage of OAO granted (0 percent, positive but smaller than 15 percent, and equal to 15 percent, respectively). A number of standard control variables are also considered in the regressions. The coefficient of *Oaoyes* is positive in all our models, and on average close to 0.08. This suggests that the inclusion of the OAO does not reduce the gross spread, but yields to an 8 basis points increase, despite none of the reported coefficients is statistically significant. While we cannot conclude that the presence of the OAO implies higher costs for the issuing firm, we can certainly reject the hypothesis of a substitution effect between the OAO and the gross spread. This result shows that issuing firms have no financial benefit (i.e., cost reduction) from granting the underwriter the OAO. The same conclusion can be drawn observing the coefficient of the multinomial variable used to measure the OAO (*Oao Class*).[10]

---

[9] Likewise, the IPO firm could grant the over-allotment option to the underwriter in order to not be charged for a higher gross spread.

[10] In the regressions the base case is *Oao Class* equal to zero.

These coefficients, although still statistically not significant, are positive and increasing in magnitude: moving from a zero to a positive (below 15 percent) level of OAO, the gross spread rises by 4 basis points, and by additional 9 basis points if the OAO is set at the highest allowed level. The signs of the other variables are generally in line with the results found in the literature. Gross spread is negatively related to the offer size, consistent with the argument of economies of scale (Ritter, 1987; Corwin and Harris, 2001). It is also negatively associated with the fraction of pre-IPO shares retained over the number of issued shares and the underwriters reputation (Logue, 1973; Carter and Manaster, 1990; Carter *et al.*, 1998), and positively related to the number of managers constituting the IPO syndicate, against the risk sharing hypothesis supported in Torstila (2001). Finally, the spread is positively affected by the offer price revision, the firm's risk (NASDAQ dummy) and the all star analyst dummy, implying that firms are more willing to bear a higher quotation cost if they are guaranteed to be covered in the aftermarket by lead analysts.

5.3 The effect on underpricing

The second potential benefit for the issuing firm is the implicit incentive for the underwriter to moderate the level of underpricing, thus to reduce the "money left on the table". Combining the over-allotted shares with the right to purchase them back at a fixed price from the issuer is equivalent to a long put option in the hands of the underwriter, who profits from an aftermarket price trading below the offer price. While this payoff is not likely to be sufficient to induce the underwriter to inflate the offer price, it can at least partially reduce the incentive to set the offer price overly below the fundamental value, leading to a smaller underpricing (price upward incentive).

Please insert Table 4 about here

Table 4 shows the effect of including the OAO on the underpricing. As for the previous analyses, the presence of the clause is investigated with a dummy and a multinomial variable, with no appreciable differences. Coefficients are always negative and the average is -0.01, implying that granting the OAO (*Oaoyes*) leads

to a 1 percentage point drop in the expected underpricing. Also, the multinomial variable evidences a negative a monotonic relationship, as *Oao Class* ranges from -0.08 to -0.016 when is equal to 1, and from -0.002 to -0.014 when equal to 2, suggesting that the underpricing is slightly reduced both when we move from zero to positive OAO (but lower than 15%) and from positive (essentially, 10%) to the maximum (15%). The negative sign would be in line with the prediction of the price upward incentive hypothesis, but the coefficients are never statistically significant. Likewise the effect on gross spread, we hence have no evidence that IPO firms are able to benefit from a reduction of the level of underpricing.

Table 4 also reports the effects of our control variables. As it has been documented in the literature, underpricing is more severe for smaller and riskier firms (Loughran and Ritter, 2004; Binay *et al.*, 2007), more pronounced during hot markets and positively associated with the fraction of the pre-IPO shares retained at the offering (Bradley and Jordan, 2002; Lowry and Murphy 2007), underwriter reputation (Beatty and Welch, 1996; Cooney *et al.*, 2001), subsequent trading volume (Krigman *et al.*, 2001) and the presence of an all-star analyst in the research staff of the lead manager (Cliff and Denis, 2004).

5.4 The effect on stabilization

The most cited benefit of the over-allotment option is the stabilization activity that underwriters perform in the aftermarket. In exchange for a more effective stabilization, the issuing firm accepts to grant the underwriters the option to buy shares at the offer price minus the spread. Accordingly, we should observe that more stabilized IPOs should be those deals in which underwriters have been granted the option to over-allot shares and to buy them from the issuing firm in the event of an aftermarket price increase.

Since underwriters are not legally required to disclose their stabilization activities, the empirical issue to identify which IPOs have been stabilized has to be addressed through the use of proxies. To this purpose, we primarily detect price support as in Hanley *et al.* (1993). We partition our sample according to four groups, depending on the 10-day return of the deal relative to the offer price. In particular, issues exhibiting a market price below the offer price by more than 3 percent are classified as belonging to group 1. Likewise, issues for which the market price at day 10 is below the offer price by no more than 3 percent are classified as belonging

to group 2. The latter deals can be assumed to be stabilized; the former deals can be either partially stabilized or not stabilized at all. Symmetrically, issues exhibiting a market price at day 10 above the offer price are classified as belonging to either group 3 or group 4 depending on whether the price exceeds the offer price by less or more than 3 percent, respectively. These IPOs are far less likely to need stabilization purchases in the aftermarket. As in Hanley *et al.* (1993), the 3 percent threshold has been chosen as it represents the average bid-ask spread in our sample (2.96 percent). The choice of day 10 as the end of the active stabilization strategy by the underwriter is to some extent arbitrary. However, 10 days is normally chosen in the literature as the time period at the end of which most of the stabilization activity ceases (Hanley *et al.*, 1993; Aggarwal, 2000). We also verify that 10 days is a suitable threshold for our sample, running cross sectional regressions for the daily bid-ask spread on a stabilization proxy and other controls for each day after the IPO, confirming that the stabilization coefficient has a diminishing effect after day 10.[11]

To verify that our stabilization dummy variable, which classifies stabilized IPOs on the basis of their fitting to group 2, or both group 1 and 2, is meaningful, we study the price behavior of stabilized IPOs *vs.* non-stabilized IPOs in the aftermarket. Stabilized IPOs exhibit a decline in prices as the stabilization ends, whilst an opposite trend is noticeable for non-stabilized IPOs. The difference between cumulative average returns of non-stabilized *vs.* stabilized IPOs is positive and significant at the 1 percent level for all days, from 10^{th} to 30^{th}. This is consistent with a temporary effect of price support (Hanley *et al.*, 1993; Boehmer and Fishe, 2002).

Since some studies find no clear evidence that prices fall immediately after the end of stabilization (e.g., Prabhala and Puri, 1999; Lewellen, 2006), we also compare the cross-sectional average standard deviation of daily returns for stabilized *vs.* non stabilized IPOs using 10-day windows. Stabilized IPOs exhibit a lower standard deviation during the first 10 days after the IPO and the standard deviation becomes similar to non-stabilized IPOs afterwards. Differences in daily standard deviation are not statistically distinguishable from zero for all 10-day

[11] The cross sectional regressions for each day follow the spirit of Hanley *et al.* (1993). Two stabilisation variables are used: the log of the ratio between market price and the offer price (expressing the "distance" from the floor represented by the IPO offer price) and the value of a put option stroke at the offer price (looking at stabilization as a protective put).

windows, except for the first (at the 1 percent level). In other words, stabilized IPOs are consistently less volatile when the underwriter provides price support. Jointly considering these two experiments, in this Section we use a dummy variable taking value of 1 for IPOs belonging to group 2. As a robustness check, in the next Section we employ three different proxies to detect stabilized deals, and the dummy variable taking value of 1 for IPOs belonging to either group 1 or 2 is the first natural candidate. All these refinements do not alter the empirical results we reach in this Section.

Please insert Table 5 about here

Having described our proxy for market stabilization, we are now ready to investigate the expected positive relation between the inclusion of the OAO and the price support activity in the aftermarket. Table 5 addresses this question, through a logit regression, in which the stabilization dummy is used as dependent variable. Surprisingly, the coefficients of both the dummy variables which identify the presence of OAO and the multinomial variable accounting for the amount of over-allotted shares are not statistically significant. This evidence does not support the theoretical predictions, as the presence of the OAO does not imply that the underwriter provides stronger price support. As for the other two theorized effects, we can reject the hypothesis that issuing firms gain by granting this option to the underwriter as no greater level of price stabilization shows up. Based on all these results taken together, we can argue that firms have no tangible benefits in exchange for granting the OAO.

The control variables show the expected signs. Smaller firms require a stronger stabilization effort, even if the reported coefficients are significant for a time sub-period only (1997-2007). Downturn market times, exhibiting a lower demand, require a more pronounced stabilization activity. Moreover, venture-backed deals, being perceived as less opaque by the market, are less frequently price supported. A positive signal to the market is provided by the ratio between the offer price and the mid-price range (*Offer Price Revision*), and the negative coefficient on the likelihood to observe a stabilized deal is expected. Finally, underwriter reputation has generally a positive effect on the probability to observe a stabilized deal. This

evidence is consistent with the fact that stabilization may be perceived as a mechanism to protect the underwriters' reputation with investors (Lewellen, 2006; Mazouz *et al.*, 2012).[12]

6 Robustness checks

The results presented in the previous Section we show that no significant effects on gross spread, underpricing and stabilization are detectable when the over-allotment option is included in the IPO prospectus. This evidence seems to confirm the conjecture that underwriters have been successful in imposing this clause in virtually any IPO deal since the late '90s, without providing actual benefits to the issuer. In order to verify the soundness of this conclusion, this Section presents a number of robustness checks aimed at validating our empirical findings.

Please insert Table 6 about here

6.1 Gross spread

Our results on the effect of the inclusion of the OAO on the gross spread paid to the underwriter might be subject to some criticisms. For instance, Chen and Ritter (2000) document a cluster of the IPO spread at the 7 percent of the IPO proceeds for virtually any US IPO between $20 million and $80 million. Abrahamson and Jenkinson (2011) show that the "7% solution" had become even more prevalent in the US IPO between 1998 and 2007 as they report that 95.4% of issues between $25 million and $100 million had exactly a 7 percent gross spread (versus 84% reported in Chen and Ritter, 2000). The standard practice to adopt a flat gross spread for medium-sized IPOs suggests that the negotiation between firm and underwriter might not be carried out by trading the concession of the over-allotment clause in exchange for a reduction of the fees. Furthermore, if a significant proportion of deals reports a gross spread precisely equal to 7 percent, the clustering of our dependent variable might originate possible distortions in the

[12] Section 6 provides some robustness checks of these results, especially in defining the stabilization dummy. No appreciable difference emerges relative to the evidence presented in Table 5.

significance of the explanatory variables.[13] In order to control for the potential bias produced by the 7 percent cluster, we excluded those observations from our sample and repeated our analyses. Panel A of Table 6 shows no appreciable difference in OAO's coefficients as they — while slightly smaller — remain not statistically significant.[14]

Torstila (2001) examines the distribution of the spread within the IPO underwriting syndicate and shows that roughly 60 percent of the fee is directed to compensate for selling services. As the lead underwriter profits much more from the management and the underwriting fee than from the distribution (or selling) component, incorporating this last component may dilute the power of the regression or even change the sign of the coefficients. In order to account for this consideration, we also run our regressions taking into account the fraction of the spread attributable to management and underwriting service only, excluding the compensation for selling services. The third and the fourth model specification in Table 6 report the results. Similarly to what found earlier, while a slight reduction of the OAO coefficients is observable, results are still statistically insignificant. This evidence further confirms that the inclusion of the OAO does not produce a different-from-zero reduction in the spread paid to the IPO syndicate.

Table 6 also reports the results of the regressions estimated for three sub-periods. Given the large time period considered in this study, it is possible that the relationship between OAO and gross spread might change over time. Figure 1 shows that both the frequency of inclusion and the size of the OAO has increased over time in our sample. Whilst at the beginning of our investigated period a non-negligible number of IPO firms were either not including the OAO or at least not granting it in full, towards the end of our sample period this variability has essentially vanished. Consequently, we can conjecture that the effort made by the underwriter to have this clause included in the agreement for the IPO deal had gone down progressively. Should this deduction being confirmed, we should observe a larger level of significance in the first part of our sample period. In order to verify our conjecture, we have split the sample into three nearly equally weighted — in terms of number of observations — sub-periods: from 1983 to 1992, from 1993 to

[13] 54.5% of our observations report exactly a gross spread equal 7 percent.
[14] The coefficients of the control variables, not reported in Table 6 to save space, show no meaningful change.

1996, and between 1996 and 2007 (see specifications 5 to 7 in Panel A of Table 6). However, although some differences in the control variables are present, we document no statistical effects on our variable of interest.[15] The OAO dummy variable (*Oaoyes*) for the first two sub-periods is very close to what reported in Table 3; the last sub-period shows instead a negative coefficient, but still not statistically different from zero.[16]

Lastly, a final robustness check has been carried out. Fernando *et al.* (2005) suggest that more prestigious underwriters protect their reputational capital and tend to match with firms that are larger, less risky, and more likely to survive and issue equity in the future. This feature is potentially critical and able to drive some of our results as we found that firms that did not grant the OAO are generally larger and less risky. In order to consider the firm-underwriter matching and the potential selection bias, we run a two-step regression where the in the first stage we estimate the probability that the issue is underwritten by a top-reputable bank (highest Carter-Manaster rank)[17] and the second stage uses the appropriate Inverse Mills Ratio to correct for the endogenous choice between firms and underwriters. However, the two-stage estimation procedure shows no difference explanatory power on the OAO variables as coefficients remain positive but statistically insignificant.

6.2 Underpricing

Our results on the effects of the inclusion of the OAO on the observed level of underpricing are also not free from possible criticisms. Panel B of Table 6 shows the main results of our robustness checks. In addition to the analyses reported in sub-Section 5.3, we subsample by different time periods and perform two-stage estimation procedures to control for possible selection bias in the firm-underwriter matching (Fernando *et al.*, 2012).

The average underpricing has changed quite dramatically over the last thirty years. If in the '80s US IPO firms were *leaving* roughly 7 percent *on the table,* in

[15] Coefficients of the control variables are in line with the extant literature. For this reason they are not reported here, but are available to the Readers upon request.
[16] Results using the trichotomous variable (*Oao Class*) confirm previous conclusions. To save space, we do not report them.
[17] In the first stage (probit regression) the OAO dummy is regressed using the following selection variables: log of the proceeds, VC dummy, the average trading volume in the month after the IPO, offer price revision, lockup dummy and year dummies.

the following decade the same figure nearly doubled, and rose to 65% during the dot.com bubble, returning to 12% during the first half the new millennium (Loughran and Ritter, 2004). Combining this evidence to the already mentioned upward trend in the use of the OAO, it is possible that the relation between the inclusion of the over-allotment clause and the level of first-day returns might have changed over time during the sample period. Instead, splitting the overall sample in three sub-periods does not produce any meaningful results.[18] Although the sign of the OAO coefficient becomes positive in the period 1993-1996, none of the three sub-periods displays a statistically significant effect, confirming the absence of any association between level of underpricing and inclusion of over-allotment clause.

Likewise the analyses conducted on gross spread, we also control for the possible selection bias originated by the firm-underwriter matching using a the two-stage regression where the first stage estimates the likelihood for the firm to be taken public by a reputable underwriter and the second stage uses the Inverse Mills ratio to correct for the possible bias. The previous results are robust as regression coefficients show no noticeable change.

6.3 Stabilization

To proxy for the aftermarket stabilization activity, in Section 5.4 we use a standard measure first proposed in Hanley *et al.* (1993), who assumes that IPOs exhibiting 10-day returns between zero and -3 percent are likely to be stabilized. Concerns might be raised about the specific threshold (-3 percent) potentially driving our results. In order to dispel this doubt, we modify Hanley *et al.* (1993) definition gradually adjusting the threshold to allow for lower (i.e., more negative) returns. Panel C of Table 6 presents the results of logit regressions for different ranges of the IPO 10-day returns that define the stabilization proxy, i.e. from (-4%, 0%) to (-8%, 0%). The binary variable *Oaoyes*, detecting the inclusion of the OAO, does not show any positive effect on the probability to observe a stabilized deal. The same

[18] We divide the sample period into three sub-periods having approximately the same number of observations. It might be argued that a more proper split should instead take into consideration the time-windows used in Loughran and Ritter (2004). We also experiment splitting the sample into the following sub-periods: from 1983 to 1989, from 1990 to 1998, from 1999 to 2000, and from 2001 to 2007. However, we find no noticeable change in the coefficients of the OAO variables.

conclusion applies to the specification (8), in which a stabilized deal is defined as belonging to either Hanley *et al.*'s (1993) group 1 or group 2.

It can be still argued that these measures do not fully capture all the available information to infer the presence of stabilization activities. For instance, 10-day returns are an indirect proxy of the interest generated around the IPO, whilst Aggarwal (2000) shows that weak IPOs are more likely to be stabilized in the aftermarket. In order to control for this concern, we follow Aggarwal (2000) and use two alternative proxies of cold IPOs (i.e., weak IPO stabilization): *S3* is a dummy which takes 1 if the offer price has been set below the minimum of the filing range and 0 if the offer price has been set over the maximum of the filing range, and *S4* is a variable which takes 1 if the first-day return is less than 5 percent. Specifications (9) and (10) in Panel C of Table 6 show no support of our hypothesis that the presence of OAO increases the probability of the IPO being stabilized. The last column in Panel C of Table 6 controls for a potential selection problem, as we first model the probability to include the OAO (instrumented by the lockup variable) and then estimate the second stage regression including the Inverse Mills ratio. We find no appreciable effect of *Oaoyes*.

To sum up, the robustness checks we have carried out confirm that issuing firms do not benefit from granting the over-allotment clause to underwriters as they experience neither a reduction in IPO cost, nor a less underpriced offer, nor a more active price support.

7 Conclusions

The over-allotment option (OAO) allows the underwriter to over-allocate up to 15 percent of the shares registered for the offer, and at the same time provides her the right to purchase them from the issuer at a predetermined price. By doing so, the underwriter protects herself against a rise in the stock price in the aftermarket. Alternatively, should the price decline over the first days after the IPO, she would profit even more from covering her initial short position at the market price. The OAO clause has become more and more standard in the IPO industry. While in the '80s 10 percent of the offers did not include this clause, nowadays virtually 100 percent of the US IPOs does. However, in spite of its non-negligible value, as it accounts for about 1.5 percent of the total proceeds, no evidence has shown what are the real benefits for the issuing firms. Some scholars have argued that granting

this option is a way to induce the underwriter to engage in active aftermarket stabilization, that otherwise would be extremely costly. Instead, given the price protection ensured by the option, the underwriter can over-sell the offer and profit from covering the naked position in the aftermarket in case of a price drop. By doing so, the underwriter also provides automatic support to the stock price.

In this paper we first model and then empirically test the impact of the OAO on (a) the aftermarket stabilization activity, (b) the underpricing, and (c) the gross spread. Despite the potential benefits for the issuing firm that should in theory be associated with granting the OAO to the underwriter, we show — using a large sample of US IPOs spanning from 1983 to 2007 — that none of these positive expected effects is actually in place. Therefore, we argue that underwriters have been successful in imposing, on top of the gross spread, an additional source of costs to IPO firms, without returning any actual benefits. Consequently, we argue that the standard IPO cost is not the "7 percent solution" documented in Chen and Ritter (2000) but a higher 8.5 percent, once that the OAO is taken into account.

References

Abrahamson, M. and T. Jenkinson, 2011, Why Don't US Issuers Demand European Fees for IPOs?, *Journal of Finance* 66, 2055-82.

Aggarwal, R., 2000, Stabilization Activities by Underwriters after Initial Public Offerings, *Journal of Finance* 55, 1075-1103.

Aggarwal, R., Prabhala, N.R. and M. Puri, 2002, Institutional Allocation in Initial Public Offerings: Empirical Evidence, *Journal of Finance* 57, 1421-1442.

Asquith, D., Jones, J.D. and R. Kieschnick, 1998, Evidence on Price Stabilization and Underpricing in Early IPO Returns, *Journal of Finance* 53, 1759-1773.

Beatty, R.P. and J.R. Ritter, 1986, Investment Banking, Reputation, and the Underpricing of Initial Public Offerings, *Journal of Financial Economics* 15, 213-232.

Beatty, R.P. and I. Welch, 1996, Issuer Expenses and Legal Liability in Initial Public Offerings, *Journal of Law and Economics* 39, 545-602.

Benveniste, L.M. and P.A. Spindt, 1989, How Investment Bankers Determine the Offer Price and Allocation of New Issues, *Journal of Financial Economics* 24, 343-361.

Benveniste, L.M. and W.J. Wilhelm, 1990, A Comparative Analysis of IPO Proceeds under Alternative Regulatory Environments, *Journal of Financial Economics* 28, 173-207.

Binay, M.M., Gatchev, V.A. and C.A. Pirinsky, 2007, The Role of Underwriter-Investor Relationships in the IPO Process, *Journal of Financial and Quantitative Analysis* 42, 785-809.

Black, F. and M. Scholes, 1973, The Pricing of Options and Corporate Liabilities, *Journal of Political Economy* 81, 637-654.

Boehmer, E. and R.P.H. Fishe, 2004, Underwriter Short Covering in the IPO Aftermarket: A Clinical Study, *Journal of Corporate Finance* 10, 575- 594.

Bradley, D.J. and B.D. Jordan, 2002, Partial Adjustment to Public Information and IPO Underpricing, *Journal of Financial and Quantitative Analysis* 37, 595-616.

Carter, R.B. and F.H. Dark, 1990, The Use of the Over-Allotment Option in Initial Public Offerings of Equity: Risks and Underwriter Prestige, *Financial Management* 19, 55-64.

Carter, R.B., Dark, F.H. and A.K. Singh, 1998, Underwriter Reputation, Initial Returns, and the Long-Run Performance of IPO Stocks, *Journal of Finance* 53, 285-311.

Carter, R. and S. Manaster, 1990, Initial Public Offerings and Underwriter Reputation. *Journal of Finance* 45, 1045-1067.

Chemmanur, T.J. and P. Fulghieri, 1994, Reputation, Renegotiation, and the Choice between Bank Loans and Publicly Traded Debt, *Review of Financial Studies* 7, 475-506.

Chemmanur, T.J., Hu, G. and J. Huang, 2010, The Role of Institutional Investors in Initial Public Offerings, *Review of Financial Studies* 23, 4496-4540.

Chen, H.-C. and J.R. Ritter, 2000, The Seven Percent Solution, *Journal of Finance* 55, 1105-1131.

Chung, R., Kryzanowski, L. and I. Rakita, 2000, The Relationship between Overallotment Options, Underwriting Fees and Price Stabilization for Canadian IPOs, *Multinational Finance Journal* 4, 5-34.

Cliff, M. and D. Denis, 2004, Do Initial Public Offering Firms Purchase Analyst Coverage with Underpricing?, *Journal of Finance* 59, 2871-2901.

Cooney, J.W., Singh, A.K., Carter, R.B. and F.H. Dark, 2001, IPO Initial Returns and Underwriter Reputation: Has the Inverse Relationship Flipped in the 1990s?, *Working Paper*.

Cornelli, F. and D. Goldreich, 2003, Bookbuilding: How Informative Is the Order Book?, *Journal of Finance* 58, 1415-1443.

Corwin, S. and J. Harris, 2001, The Initial Listing Decisions of Firms That Go Public, *Financial Management* 30, 35-55.

Ellis, K., Michaely, R. and M. O'Hara, 2000, When the Underwriter Is the Market Maker: An Examination of Trading in the IPO Aftermarket, *Journal of Finance* 55, 1039-1074.

Fernando, C.S., Gatchev, V.A. and P.A. Spindt, 2005, Wanna Dance? How Firms and Underwriters Choose Each Other, *Journal of Finance* 60, 2437-2469.

Fernando, C.S., May, A.D. and W.L. Megginson, 2012, The Value of Investment Banking Relationships: Evidence from the Collapse of Lehman Brothers, *Journal of Finance* 67, 235-270.

Fishe, R.P.H., 2002, How Stock Flippers Affect IPO Pricing and Stabilization, *Journal of Financial and Quantitative Analysis* 37, 319-340.

Franzke, S.A. and C. Schlag, 2002, Over-Allotment Options in IPOs on Germany's Neuer Markt: An Empirical Investigation, *CFS Working Paper No. 2002/16*.

Hanley, K., Kumar, A. and P. Seguin, 1993, Price Stabilization in the Market for New Issues, *Journal of Financial Economics* 34, 177-197.

Hansen, R.S., Fuller, B.R. and V. Janjigian, 1987, The Over-Allotment Option and Equity Financing Flotation Costs: An Empirical Investigation, *Financial Management* 16, 24-32.

Krigman, L., Shaw, W.H. and K.L. Womack, 2001, Why Do firms Switch Underwriters?, *Journal of Financial Economics* 60, 245-284.

Lewellen, K., 2006, Risk, Reputation, and IPO Price Support, *Journal of Finance* 61, 613-653.

Logue, D.E., 1973, On the Pricing of Unseasoned Equity Issues: 1965-1969, *Journal of Financial and Quantitative Analysis* 8, 91-103.

Loughran, T. and J.R. Ritter, 2004, Why Has IPO Underpricing Changed over Time?, *Financial Management* 33, 5-37.

Lowry, M. and K.J. Murphy, 2007, Executive Stock Options and IPO Underpricing, *Journal of Financial Economics*, 85, 39-65.

Mazouz, K., Agyei-Ampomah, S., Saadouni, B. and S. Yin, 2012, Stabilization and the Aftermarket Prices of Initial Public Offerings, *Review of Quantitative Finance and Accounting*, 1-23

Prabhala, N.R. and M. Puri, 1999, What Type of IPOs Do Underwriters Support and Why? The Role of Price Support in the IPO Process, *Working Paper*.

Ritter, J.R., 1987, The Costs of Going Public, *Journal of Financial Economics*, 269-281.

Rock, K., 1986, Why New Issues are Underpriced, *Journal of Financial Economics* 15, 187-212.

Spatt, C. and S. Srivastava, 1991, Preplay Communication, Participation Restrictions, and Efficiency in Initial Public Offerings, *Review of Financial Studies* 4, 709-726.

Torstila, S., 2001, The Distribution of Fees Within the IPO Syndicate, *Financial Management* 30, 25-43.

Figure 1 - Payoff from Over-Allotted Shares

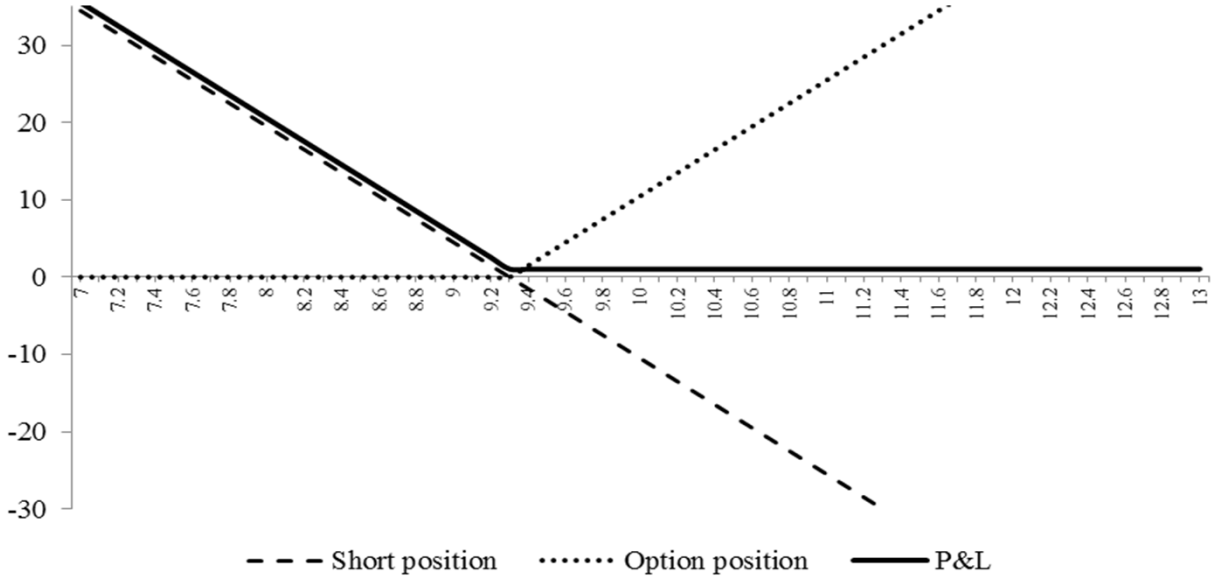

Figure 2 - IPO Distribution and OAO Frequency

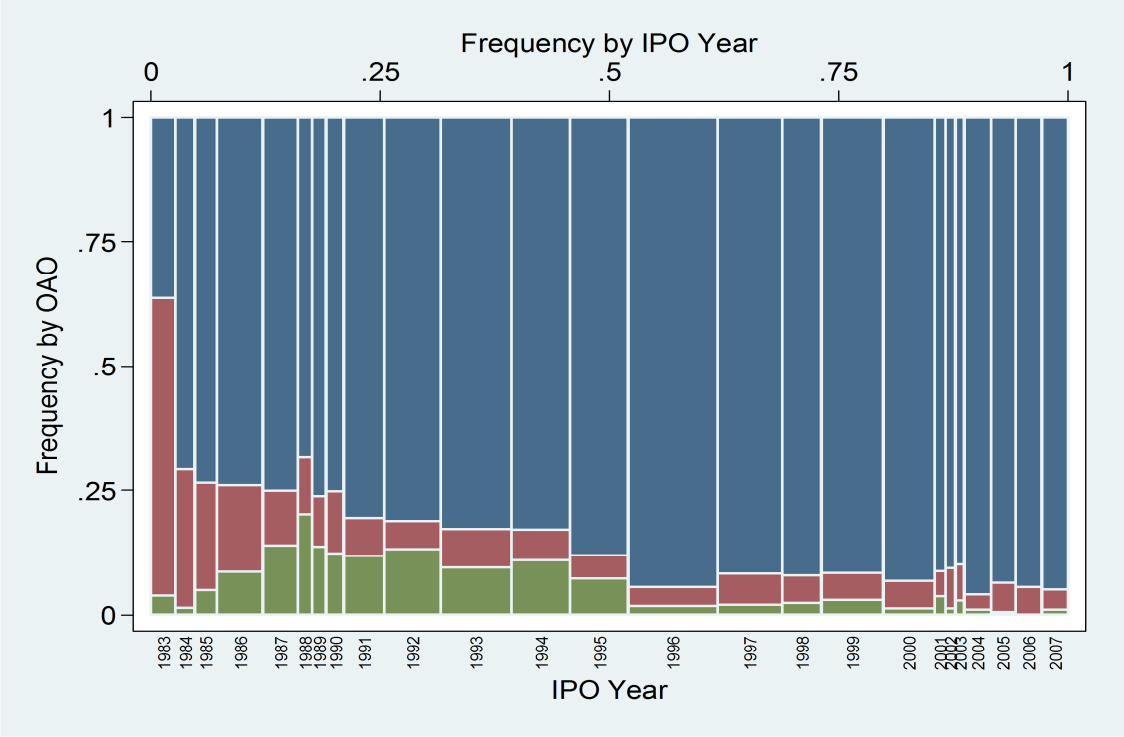

Table 1 - Descriptive Statistics

	No Overallotment			Overallotment			DIFFERENCE	
Variable Long Name	**N**	**Mean**	**Median**	**N**	**Mean**	**Median**	**Mean**	**Median**
Proceeds ($ mln)	415	192.884	98.1546	6,399	106.226	45.8371	86.66 ***	52.3175 ***
Total Asset ($ mln)	188	2464.95	303	4,665	561.672	33.7	1903.3 ***	269.3 ***
Debt ($ mln)	164	861.156	142.6	3,850	512.495	5.8	348.7	136.8 ***
Market Cap ($ mln)	179	1330.45	230.529	4,895	534.729	46.474	795.7	184.055 ***
Revenues ($ mln)	92	1490.66	597.05	1,068	482.092	65.35	1008.6 ***	531.7 ***
Offer Price	415	365.09	15	6,399	18.388	12	346.7 ***	3 ***
Offer Price Position	285	-0.0269	0	6,264	-0.0015	0	-0.0254 *	0 **
Filing Range Width	233	0.15289	0.14286	5,571	0.16686	0.16216	-0.014 ***	-0.0193 ***
Gross Spread (%)	383	6.22738	6.5	6,375	7.2144	7	-0.987 ***	-0.5 ***
Management Spread (% of GS)	332	20.5166	20.125	5,438	20.7257	20.17	-0.209	-0.045
Selling Spread (% of GS)	332	57.6888	58.415	5,436	57.5987	58.73	0.0901	-0.315
Underwriting Spread (% of GS)	332	21.7948	20.985	5,438	21.6965	20.78	0.0983	0.205
Managers (No.)	414	2.4686	2	6,399	2.63463	2	-0.166	0
Bookrunners (No.)	415	1.03374	1	6,399	1.0958	1	-0.0621 ***	0 ***
Global Coordinators (No.)	252	1.05159	1	992	1.0877	1	-0.0361	0 ***
Underpricing	350	0.05635	0.01227	6,209	0.13757	0.06662	-0.0812 ***	-0.0543 ***
Overhang	189	7.3977	3.2	4,951	3.71685	2.43778	3.681 ***	0.76222 ***
Reputation	382	8.26101	9	5,562	7.02365	8	1.237 ***	1 ***
Company Age	277	23.9061	12	5,863	14.779	7	9.127 ***	5 ***
Turnover	351	0.12685	0.03774	6,214	0.06808	0.04598	0.0588 ***	-0.0082 ***
Volatility	305	0.48584		6,160	0.627		-0.141 ***	0 ***
Pre-IPO Market Return	349	0.0063	0.00629	6,210	0.01273	0.01448	-0.00643 *	-0.0082 ***
Pre-IPO Market Volatility	349	0.11653	0.10273	6,210	0.1502	0.12058	-0.0337 ***	-0.0178 ***
IPO Frequency	351	96.3732	93	6,214	95.4857	94	0.888	-1
IPO Returns	351	13.2803	10.1	6,214	20.1345	13.55	-6.854 ***	-3.45 ***
Tech Dummy	415	0.24578		6,399	0.38631		-0.141 ***	
Nasdaq Dummy	415	0.48193		6,399	0.80325		-0.321 ***	
Lockup Dummy	401	0.04988		6,381	0.68202		-0.632 ***	
Venture Backed Dummy	353	0.1728		5,865	0.37937		-0.207 ***	
Analyst Dummy	415	0.18795		6,399	0.55087		-0.363 ***	
All-Star Analyst Dummy	415	0.04819		6,399	0.09752		-0.0493 ***	
Stabilization Dummy #1	351	0.07977		6,214	0.05472		0.0251 *	
Stabilization Dummy #2	351	0.32194		6,214	0.25877		0.0632 **	
Stabilization Dummy #3	198	0.46465		4,135	0.38259		0.0821 *	
Stabilization Dummy #4	350	0.07429		6,209	0.06732		0.0070	

Table 2 - The Use of OAO: Logit and Ordered Logit

Spedification	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	Oaoyes	Oaoyes	Oaoyes	Oao_class	Oao_class	Oao_class
Model	Probit	Probit	Probit	Ologit	Ologit	Ologit
Log (1 + Proceeds)	-0.538***	-0.588***	-0.353***	-0.600***	-0.637***	-0.530***
	(0.089)	(0.095)	(0.043)	(0.087)	(0.092)	(0.049)
IPO_frequency	0.002	0.002	0.002	0.001	0.001	0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
IPO_returns	0.004	0.005	0.006	-0.004	-0.004	-0.000
	(0.008)	(0.008)	(0.006)	(0.007)	(0.007)	(0.006)
Pre-IPO market return	1.519	1.431	1.142	1.777	1.736	1.849*
	(1.465)	(1.461)	(0.966)	(1.442)	(1.435)	(1.075)
Pre-IPO market sd	-2.411*	-2.186	-1.467	-0.043	-0.011	-0.535
	(1.385)	(1.431)	(0.897)	(1.382)	(1.394)	(0.995)
Tech dummy	0.255		-0.041	0.402***		0.225**
	(0.159)		(0.098)	(0.152)		(0.110)
All star analysts (dummy)	0.049		0.209	0.164		0.369**
	(0.202)		(0.148)	(0.230)		(0.176)
# of lead and co-manager	0.184**	0.193**	0.069**	0.039	0.042	0.020
	(0.080)	(0.080)	(0.034)	(0.048)	(0.048)	(0.032)
VC backed firm (dummy)	-0.324**	-0.241*	0.025	0.118	0.250*	0.276***
	(0.140)	(0.134)	(0.095)	(0.139)	(0.133)	(0.106)
Trading volume	-0.090	-0.019		0.186	0.334	
	(0.501)	(0.509)		(0.651)	(0.667)	
Offer price	1.277***	1.410***	0.879***	0.743**	0.854**	0.336
	(0.378)	(0.381)	(0.249)	(0.374)	(0.375)	(0.273)
Overhang	-0.003	-0.001		-0.011	-0.009	
	(0.010)	(0.010)		(0.009)	(0.009)	
Range	-0.972	-0.483		-1.038	-0.894	
	(1.446)	(1.429)		(1.201)	(1.203)	
Carter-Manaster reputation	-0.036	-0.043		-0.015	-0.015	
	(0.055)	(0.055)		(0.045)	(0.045)	
Dummy lockup	2.241***	2.224***	1.892***	2.510***	2.484***	2.331***
	(0.206)	(0.207)	(0.121)	(0.184)	(0.184)	(0.130)
Nasdaq IPO (dummy)		-0.144			-0.072	
		(0.166)			(0.158)	
Analysts (dummy)		0.433			0.321	
		(0.275)			(0.288)	
Constant	4.335***	4.514***	2.693***			
	(0.785)	(0.806)	(0.415)			
Constant 1 (_cut1)				-3.779***	-3.997***	-2.984***
				(0.662)	(0.697)	(0.433)
Constant 2 (_cut2)				-1.984***	-2.207***	-1.421***
				(0.654)	(0.689)	(0.428)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,969	2,969	5,426	3,510	3,510	5,824
e(N)	0.432	0.433	0.392	0.227	0.225	0.212

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3 - The Effect of OAO on Gross Spread

Specification	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	GS	GS	GS	GS	GS	GS
Sample	Full	Full	Full	Full	Full	Full
Model	OLS	OLS	OLS	OLS	OLS	OLS
Oaoyes	0.072	0.083	0.094			
	(0.062)	(0.068)	(0.069)			
1.Oao_class				0.038	0.041	0.051
				(0.069)	(0.079)	(0.079)
2.Oao_class				0.080	0.090	0.101
				(0.062)	(0.069)	(0.069)
Log (1 + Proceeds)	-0.416***	-0.528***	-0.543***	-0.415***	-0.526***	-0.541***
	(0.016)	(0.020)	(0.020)	(0.017)	(0.020)	(0.020)
IPO_frequency	0.000	-0.000	-0.000	0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
IPO_returns	0.001	0.001	0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Pre-IPO market return	-0.112	-0.247	-0.220	-0.113	-0.250	-0.222
	(0.216)	(0.262)	(0.262)	(0.216)	(0.262)	(0.262)
Pre-IPO market sd	-0.387*	-0.402*	-0.294	-0.387*	-0.403*	-0.293
	(0.199)	(0.241)	(0.244)	(0.199)	(0.241)	(0.244)
Tech dummy	0.012	-0.019		0.011	-0.020	
	(0.023)	(0.027)		(0.023)	(0.027)	
All star analysts (dummy)	0.113***	0.218***		0.113***	0.218***	
	(0.034)	(0.043)		(0.034)	(0.043)	
# of lead and co-manager	0.018**	0.040***	0.041***	0.018**	0.041***	0.041***
	(0.009)	(0.011)	(0.011)	(0.009)	(0.011)	(0.011)
VC backed firm (dummy)	0.003	-0.003	0.003	0.002	-0.004	0.002
	(0.022)	(0.028)	(0.026)	(0.022)	(0.028)	(0.026)
Trading volume	0.247**	0.255*	0.334**	0.245**	0.253*	0.332**
	(0.113)	(0.144)	(0.145)	(0.113)	(0.144)	(0.145)
Offer price	0.440***	0.730***	0.783***	0.440***	0.731***	0.784***
	(0.055)	(0.067)	(0.067)	(0.055)	(0.067)	(0.067)
Overhang	-0.005***	-0.012***	-0.013***	-0.005***	-0.012***	-0.013***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Range	0.273			0.277		
	(0.203)			(0.203)		
Carter-Manaster reputation	-0.126***	-0.204***	-0.198***	-0.126***	-0.204***	-0.199***
	(0.007)	(0.008)	(0.008)	(0.007)	(0.008)	(0.008)
Dummy lockup	-0.051*			-0.054*		
	(0.031)			(0.031)		
Nasdaq IPO (dummy)			-0.129***			-0.130***
			(0.036)			(0.036)
Analysts (dummy)			0.008			0.007
			(0.045)			(0.045)
Dummy Year	Yes	Yes	Yes	Yes	Yes	Yes
Constant	9.564***	10.814***	10.906***	9.578***	10.830***	10.922***
	(0.140)	(0.145)	(0.150)	(0.140)	(0.146)	(0.151)
Observations	3,509	3,969	3,969	3,509	3,969	3,969
R-squared	0.451	0.576	0.575	0.451	0.576	0.575

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4 - The Effect of OAO on Underpricing

Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dependent variable	UP	UP	UP	UP	UP	UP	UP	UP	UP
Sample	Full	Full	Full	Full	Full	Full	85-92	93-96	96-07
Model	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Oaoyes	-0.003	-0.010	-0.014				-0.011	0.025	-0.051
	(0.018)	(0.017)	(0.017)				(0.016)	(0.023)	(0.059)
1.Oao_class				-0.008	-0.011	-0.016			
				(0.020)	(0.020)	(0.020)			
2.Oao_class				-0.002	-0.010	-0.014			
				(0.018)	(0.017)	(0.017)			
Log (1 + Proceeds)	-0.024***	-0.022***	-0.022***	-0.024***	-0.022***	-0.022***	-0.001	-0.014*	-0.031***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.008)	(0.010)
IPO_frequency	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	0.000	-0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
IPO_returns	0.002***	0.002***	0.002***	0.002***	0.002***	0.002***	0.002***	0.001	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)
Pre-IPO market return	0.432***	0.456***	0.446***	0.432***	0.456***	0.446***	0.367***	0.573***	0.414***
	(0.063)	(0.065)	(0.066)	(0.063)	(0.065)	(0.066)	(0.079)	(0.121)	(0.107)
Pre-IPO market sd	0.137**	0.144**	0.127**	0.137**	0.144**	0.127**	-0.057	0.331***	0.149
	(0.058)	(0.060)	(0.061)	(0.058)	(0.060)	(0.061)	(0.091)	(0.103)	(0.096)
Tech dummy	0.022***	0.026***		0.021***	0.026***		0.018**	-0.000	0.043***
	(0.007)	(0.007)		(0.007)	(0.007)		(0.007)	(0.008)	(0.014)
All star analysts (dummy)	0.030***	0.043***		0.030***	0.043***			0.012	0.028
	(0.010)	(0.011)		(0.010)	(0.011)			(0.011)	(0.018)
# of lead and co-manager	-0.001	-0.000	0.000	-0.001	-0.000	0.001	-0.007	0.000	-0.001
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.005)	(0.003)	(0.005)
VC backed firm (dummy)	0.023***	0.020***	0.026***	0.023***	0.020***	0.026***	0.015**	0.005	0.043***
	(0.006)	(0.007)	(0.007)	(0.006)	(0.007)	(0.007)	(0.007)	(0.008)	(0.015)
Trading volume	0.346***	0.429***	0.438***	0.346***	0.429***	0.438***	0.370***	0.536***	0.300***
	(0.033)	(0.036)	(0.036)	(0.033)	(0.036)	(0.036)	(0.075)	(0.072)	(0.049)
Offer price	0.541***	0.494***	0.504***	0.541***	0.494***	0.504***	0.222***	0.379***	0.758***
	(0.016)	(0.017)	(0.017)	(0.016)	(0.017)	(0.017)	(0.022)	(0.023)	(0.031)
Overhang	0.002***	0.002***	0.002***	0.002***	0.002***	0.002***	0.001	0.005***	0.002**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Range	-0.089			-0.088			0.011	0.081	-0.363**
	(0.059)			(0.059)			(0.049)	(0.091)	(0.151)
Carter-Manaster reputation	0.009***	0.004*	0.003	0.009***	0.004*	0.003	-0.000	0.006**	0.014***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.005)
Dummy lockup	-0.023**			-0.024***			0.022	-0.007	-0.010
	(0.009)			(0.009)			(0.014)	(0.013)	(0.017)
IPO Nasdaq negotiated (dummy)			0.009			0.009			
			(0.009)			(0.009)			
Analysts (dummy)			0.034***			0.034***			
			(0.011)			(0.011)			
Dummy Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.081**	0.083**	0.094**	0.084**	0.084**	0.094**	0.059	-0.024	0.212**
	(0.041)	(0.036)	(0.038)	(0.041)	(0.036)	(0.038)	(0.039)	(0.050)	(0.091)
Observations	3,508	3,971	3,971	3,508	3,971	3,971	1,098	1,143	1,267
R-squared	0.551	0.462	0.459	0.551	0.462	0.459	0.276	0.419	0.597

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5 - Effect of OAO on Stabilization

Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dependent variable	STAB	STAB	STAB	STAB	STAB	STAB	STAB	STAB_W	STAB_W
Sample	Full	Full	Full	Full	85-92	93-96	97-07	Full	Full
Model	LOGIT	LOGIT	LOGIT	LOGIT	LOGIT	LOGIT	LOGIT	LOGIT	LOGIT
1.Oao_class	-0.602	-0.614						-0.539**	
	(0.381)	(0.470)						(0.230)	
2.Oao_class	-0.355	-0.552						-0.341*	
	(0.313)	(0.419)						(0.195)	
Oaoyes			-0.395	-0.565	-0.084	0.601	-1.545		-0.370*
			(0.310)	(0.415)	(0.484)	(1.116)	(1.148)		(0.194)
Log (1 + Proceeds)	-0.080	-0.056	-0.091	-0.058	-0.127	-0.049	-0.564**	-0.127**	-0.132**
	(0.112)	(0.125)	(0.112)	(0.124)	(0.172)	(0.312)	(0.270)	(0.061)	(0.061)
IPO_frequency	0.002	0.002	0.002	0.002	-0.000	0.010**	0.001	0.006***	0.006***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.005)	(0.005)	(0.002)	(0.002)
IPO_returns	-0.030**	-0.029**	-0.030**	-0.029**	-0.046*	-0.074**	0.007	-0.008*	-0.008*
	(0.013)	(0.014)	(0.013)	(0.014)	(0.024)	(0.033)	(0.008)	(0.005)	(0.005)
Pre-IPO market return	-3.878**	-5.068***	-3.901**	-5.077***	-4.085	6.237	-10.221***	-3.039***	-3.028***
	(1.726)	(1.952)	(1.726)	(1.952)	(3.018)	(4.894)	(3.176)	(0.856)	(0.856)
Pre-IPO market sd	0.861	-1.094	0.860	-1.097	-2.047	0.743	-2.997	0.416	0.409
	(1.537)	(1.808)	(1.537)	(1.808)	(3.420)	(4.062)	(2.146)	(0.785)	(0.784)
Tech dummy		-0.244		-0.243	-0.422	-0.373	0.186		
		(0.202)		(0.202)	(0.314)	(0.387)	(0.383)		
All star analysts (dummy)		-0.208		-0.208		0.421	-1.244		
		(0.354)		(0.354)		(0.434)	(0.760)		
# of lead and co-manager	0.015	0.039	0.014	0.039	0.355**	-0.447*	0.128	0.008	0.006
	(0.063)	(0.054)	(0.064)	(0.054)	(0.158)	(0.256)	(0.124)	(0.035)	(0.035)
VC backed firm (dummy)	-0.448***	-0.386**	-0.443***	-0.385**	-0.119	-0.267	-0.643	-0.088	-0.084
	(0.171)	(0.188)	(0.171)	(0.188)	(0.262)	(0.355)	(0.402)	(0.085)	(0.085)
Overhang	-0.019	-0.038	-0.020	-0.038	-0.044	-0.005	-0.050	-0.009	-0.009
	(0.015)	(0.023)	(0.015)	(0.023)	(0.033)	(0.040)	(0.057)	(0.007)	(0.007)
Range		-2.278		-2.264	-0.656	-6.157	-4.395		
		(1.810)		(1.807)	(1.934)	(4.346)	(4.208)		
Carter-Manaster reputation	0.120**	0.041	0.120**	0.041	0.004	0.057	0.093	-0.039	-0.039
	(0.050)	(0.057)	(0.050)	(0.057)	(0.079)	(0.109)	(0.118)	(0.024)	(0.024)
Dummy lockup		0.493		0.498	-0.580*	0.034	0.846		
		(0.318)		(0.318)	(0.323)	(0.514)	(0.528)		
IPO Nasdaq negotiated (dummy)	-0.508***		-0.509***		-0.445*	-0.483	-0.683	-0.493***	-0.490***
	(0.185)		(0.185)		(0.264)	(0.478)	(0.472)	(0.107)	(0.106)
Analysts (dummy)	-0.282		-0.276					-0.217	-0.212
	(0.286)		(0.286)					(0.140)	(0.140)
Constant	-2.737***	-1.991*	-2.783***	-2.010*	-0.872	-1.833	0.709	-0.220	-0.280
	(0.865)	(1.081)	(0.864)	(1.078)	(1.092)	(1.862)	(1.859)	(0.453)	(0.451)
Year dummies	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes
Observations	3,990	3,439	3,990	3,439	1,096	1,144	1,246	3,990	3,990
Pseudo R-squared	0.0771	0.0809	0.0765	0.0809	0.0478	0.0571	0.0945	0.0512	0.0508

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 6 - Robustness analyses

Panel A: OAO and gross spread

Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dependent variable	GS	GS	GS	GS	GS	GS	GS	GS	GS
Sample	No7%	No7%	NoSelling	NoSelling	85-92	93-96	96-07	Full	Full
Model	OLS	OLS	OLS	OLS	OLS	OLS	OLS	2Stage	IV / OAO
Oaoyes	0.011		0.009		0.068	0.060	-0.087	0.166	0.043
	(0.116)		(0.032)		(0.090)	(0.082)	(0.180)	(0.136)	(0.059)
1.Oao_class		-0.027		-0.036					
		(0.128)		(0.036)					
2.Oao_class		0.022		0.019					
		(0.117)		(0.032)					
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Invers Mills Ratio								-0.046	
								0.759	
Instrument									Lockup
Constant	10.572***	10.580***	4.194***	4.212***	10.047***	9.275***	9.149***	10.760***	9.655***
	(0.279)	(0.279)	(0.075)	(0.075)	(0.216)	(0.176)	(0.277)	(0.277)	(0.119)
Observations	1,247	1,247	3,281	3,281	1,098	1,145	1,266	3,969	3,969
R-squared	0.601	0.601	0.452	0.453	0.637	0.516	0.243		0.4499

Panel B: OAO and underpricing

Specification	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	UP	UP	UP	UP	UP	UP
Sample	85-92	93-96	96-07	Full	Full	Full
Model	OLS	OLS	OLS	2Stage	IV / OAO	IV / All Star
Oaoyes	-0.011	0.025	-0.051	0.010	-0.002	-0.022
	(0.016)	(0.023)	(0.059)	(0.018)	(0.018)	(0.021)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Invers Mills Ratio				-0.058***		
				(0.018)		
Instruments					Range	Managers Reputation
Constant	0.059	-0.024	0.212**	0.109***	0.035	0.132***
	(0.039)	(0.050)	(0.091)	(0.037)	(0.031)	(0.042)
Observations	1,098	1,143	1,267	3,971	3,508	3,508
R-squared	0.276	0.419	0.597		0.550	0.440

Table 6 - Robustness analyses (continued)

Panel C: OAO and stabilization

Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(7)
Dependent variable	STAB	STAB	STAB	STAB	STAB	STAB	STAB	STAB_U	STAB_F
Sample	(-4%, 0%)	(-5%, 0%)	(-6%, 0%)	(-7%, 0%)	(-8%, 0%)	(-9%, 0%)	(-10%, 0%)	Full	Full
Model	LOGIT	LOGIT	LOGIT	LOGIT	LOGIT	LOGIT	LOGIT	LOGIT	LOGIT
Oaoyes	-0.224	-0.247	-0.216	-0.535*	-0.388	-0.362	-0.432	-0.433	-0.611**
	(0.400)	(0.365)	(0.349)	(0.306)	(0.302)	(0.295)	(0.290)	(0.418)	(0.251)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-2.267**	-2.246**	-1.666**	-1.416*	-1.358*	-1.187*	-0.857	0.623	2.031***
	(0.958)	(0.872)	(0.801)	(0.752)	(0.724)	(0.704)	(0.680)	(0.868)	(0.551)
Observations	3,439	3,486	3,486	3,486	3,486	3,486	3,486	3,988	2,613
R-squared	0.0761	0.0667	0.0555	0.0575	0.0567	0.0582	0.0600	0.108	0.129

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Appendix - Variable Definition

Variable Short Name	Variable Long Name	Variable Description
OAO	*OAO (% of Offered Shares)*	Percentage of over-allotment option granted (0 if not present)
OAO_exer	*OAO Exercise (%)*	Percentage of over-allotment option exercised (missing if *OAO* = 0)
Oao_class	*OAO Class Variable*	Categorical variable equal to: 0 if OAO = 0, 2 if OAO = .15, 1 otherwise
Oaoyes	*OAO Dummy*	Dummy variable that takes 1 if the IPO includes the over-allotment option
Proceeds	*Proceeds ($ mln)*	Proceeds of the IPO (amount raised, 2007 $ mln)
Total_asset	*Total Asset ($ mln)*	Amount of total assets before the IPO ($ mln)
Debt	*Debt ($ mln)*	Amount of debt before the IPO ($ mln)
Mktcap	*Market Cap ($ mln)*	Total capitalisation ($ mln)
Revenues	*Revenues ($ mln)*	Amount of revenues before the IPO ($ mln)
Offer_price	*Offer Price*	IPO offer price
Offer_price_revW	*Offer Price Position*	IPO offer price divided by middle value of filing range
Range	*Filing Range Width*	Width of the filing range divided by the middle of the interval
Gross_spread	*Gross Spread (%)*	(Total) percentage fee to underwriters, %
Management_spread	*Management Spread (% of GS)*	Percentage of *Gross_spread* as management fee, %
Selling_spread	*Selling Spread (% of GS)*	Percentage of *Gross_spread* as selling fee, %
Underwriting_spread	*Underwriting Spread (% of GS)*	Percentage of *Gross_spread* as underwriting fee, %
Managers	*Managers (No.)*	Numbers of underwriters composing the syndicate (lead & co-managers)
Bookrunners	*Bookrunners (No.)*	Numbers of bookrunners
Globalcoordinators	*Global Coordinators (No.)*	Numbers of global coordinators
Underpricing	*Underpricing*	Return on the IPO the first trading day
Overhang	*Overhang*	Number of shares prior to the IPO divided by the number of shares offered
Tech	*Tech Dummy*	Dummy variable that takes 1 if the issuing firm is a technology company (see Cliff and Danis, 2005)
Nasdaq	*Nasdaq Dummy*	Dummy variable that takes 1 if the stock trades at NASDAQ (0 = NYSE)
Reputation	*Reputation*	Carter and Manaster measure of underwriters reputation
Age	*Company Age*	Age of the offering firm
Lockup	*Lockup Dummy*	Dummy variable that takes 1 if a lock-up clause is present
VC_backed	*Venture Backed Dummy*	Dummy variable that takes 1 if the IPO is venture-backed
Analyst	*Analyst Dummy*	Dummy variable that takes 1 if the IPO is followed by analysts
All_Star	*All-Star Analyst Dummy*	Dummy variable that takes 1 if the IPO is followed by analysts classified as "all-star"
Turnover	*Turnover*	Average trading volume the month following the IPO
Volatility	*Volatility*	Standard deviation of returns (annualized) of the first 30 days post-IPO
PreIPO_rt	*Pre-IPO Market Return*	Monthly return on the market index prior to the IPO
PreIPO_sd	*Pre-IPO Market Volatility*	Monthly standard deviation on the market index prior to the IPO
IPO_frequency	*IPO Frequency*	Number of IPOs in month of issue and prior month
IPO_returns	*IPO Returns*	Average IPO underpricing in month of issue and prior month
Stab, Stab_W	*Stabilization Dummy #1, 2*	Dummy that takes 1 if the IPO belongs to group 2 or both groups 1 and 2, Hanley et al. (1993)
Stab_F	*Stabilization Dummy #3*	Dummy that takes 1 (0) if the offer price is smaller (greater) than the lower (upper) bound of the range
Stab_U	*Stabilization Dummy #4*	Dummy that takes 1 if the return on the first trading day is smaller than -0.05