Valuation and performance of reallocated IPO shares

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Shares in book-building IPOs can be reallocated in different proportions between retail and institutional investors, compared to the target allocation initially reported in official prospectuses. We use a sample of 195 Italian IPOs to discover an increased reallocation to retail investors in IPOs overvalued compared to peer firms. Institutional investors benefit from reallocation as they obtain more shares in IPOs with better long run performance.

Keywords: Initial public offerings IPO allocation Long run valuation IPO valuation

1. Introduction

Shares in initial public offerings (IPOs) are allocated almost universally using book-building. This process delivers to the issuer and underwriters the possibility to discretionally allocate shares. Optimistically, such discretion is meant to be used to reward investors for truthfully revealing their demand functions regarding the IPO's value (Benveniste and Spindt, 1989). Further, many papers support discretionary allocation's information-revelatory role. Degeorge et al. (2007) and Gao and Ritter (2010) demonstrate that book-building creates beneficial marketing effects that affect the demand curve's elasticity. Benveniste and Spindt (1989) and Benveniste and Wilhelm (1990) document that information collected through bookbuilding limits uncertainty and information asymmetries, allows for more reliable pricing, and therefore reduces the IPO shares' degree of underpricing. Cornelli and Goldreich (2003) further confirm book-building's strategic function, as they discover that underwriters tend to penalize flipper investors in the allocation process to provide more stability in the aftermarket.

However, book-building generates a moral hazard for underwriters, as the ability to allocate IPO shares gives them control over who may benefit from the expected "money left on the table." Loughran and Ritter (2002, 2004) coherently argue that underwriters may attempt to excessively underprice shares and allocate them to institutional investors in return for commission business. Institutionals are favored, with a higher allocation of shares in IPOs with higher underpricing (Cornelli and Goldreich, 2001; Ljungqvist and Wilhelm, 2002) and higher long-term performance (Boehmer et al., 2006). Liu and Ritter (2010) indicate that underwriters favorably allocate IPO shares to executives to sway their decisions in choos-ing which investment banks to hire.

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E-mail addresses: matteo.bonaventura@mail.polimi.it (M. Bonaventura), giancarlo.giudici@polimi.it (G. Giudici), silvio.vismara@unibg.it (S. Vismara).

©2018. This manuscript version is made available under the CC-BY-NC-ND 4.0 license http://creativecommons.org/licenses/by-nc-nd/4.0/ Published Journal Article available at: http://dx.doi.org/10.1016/j.intfin.2017.05.005 The aforementioned studies commonly find that institutional investors receive preferential treatment over retail investors. Despite this important fact, few studies use information regarding the allocation of shares in IPOs *during* the bookbuilding (Ritter and Welch, 2002). Most studies instead focus on price adjustments or price revisions, which measure the change between the mid-point in the initial filing price range and the final offer price. Nonetheless, underwriters in "hybrid" IPOs are also allowed to adjust allocation schemes by increasing the number of offered shares (the "greenshoe" option) or by changing the proportion of shares allotted to institutional and retail investors (the "clawback" option). We contribute to this stream of literature by investigating whether underwriters use these options to reallocate IPO shares between institutional and retail investors compared with pre-IPO intentions, depending on their valuation.

We expect the reallocation of shares to be affected by the IPOs' valuation, as underwriters canvass market demand and finalize the shares' pricing during the book-building process (Kim and Ritter, 1999). Underwriters face a trade-off when valuing IPOs. On the one hand, they have incentives to elevate the valuation, to increase profits from underwriting fees while leaving the issuer satisfied with the greater capital available for future investments. On the other hand, overpricing IPOs may be dangerous in the long-term, as investors may become reluctant to subscribe to future equity issues underwritten by the same investment bank. This menace in not subscribing to future offers functions as a deterrent to overpricing only when underwriters face repeat players in the IPO market. Further, Paleari et al. (2014) document that underwriters pricing IPOs systematically exclude candidate-comparable firms that depict a given IPO as overvalued, thereby more easily placing its shares with retail investors. Notably, the selection of peers published in IPO prospectuses is associated with higher valuations than those published in the same firm's post-IPO equity research reports by the same investment bank (Vismara et al., 2015).

In this paper, we study whether and how shares' valuation impact their reallocation in the book-building process. We use data from the Italian stock exchange on 195 IPOs from 1997 to 2013, which allows us to observe not only the final, effective allocation, but also the allocation expected by the underwriter before the book-building process and published in the prospectus. This is the only allocation observable by retail investors in deciding whether to subscribe to the offering. Such data is not publicly available and accessible elsewhere to investors, to the best of our knowledge. The closest studies regarding the reallocation of shares during the IPO process are also based on a sample of Italian IPOs, but do not consider valuation measures and long-term performance. For instance, Boreiko and Lombardo (2011) study the relationship between the exercising of the clawback option and initial underpricing, while Bertoni and Giudici (2014) consider the endogeneity between allocation and pricing strategies. The study of IPOs' reallocations are of broader interest, as hybrid IPOs are common in other countries, such as Germany, Spain, and France (limited to some types of offerings), as well as Hong Kong and Singapore, with slightly different institutional settings. France's "offre à prix ouvert" IPOs release no infor-mation regarding their final allocations, but share unconstrained allocations in dual-tranche IPOs (Ljungqvist and Wilhelm, 2002). Retail investors in China Hu An Cable's notable IPO in Singapore¹ bid for over 113 million shares for only 5 million shares available in the retail tranche. The clawback and greenshoe (overallotment) options allowed underwriters to shift 35 million shares toward the retail tranche. Unfortunately, the company's stock price decreased by 12.8% on the first trading day, despite overwhelming interest from retail investors. Our study's results will be helpful to increase our understanding of these phenomena.

Specifically, we find that more overvalued shares are more likely to be reallocated to retail investors. Overvaluation is estimated both with respect to peer listed companies and through the residual income model. Reallocation in favor of retail investors is more likely to occur in privatizations, which have higher incentives to please retail investors. Venture capitalists' (VCs) preference for institutional investors, in contrast, decreases the likelihood that shares of VC-backed IPOs will be real-located to retail investors. We further demonstrate that a larger reallocation to institutional investors predicts better long-term market performance. These findings point to underwriters using reallocation practices to favor institutional investors. This evidence, on an important and understudied aspect of the IPO process, carries implications for broader work on financial misconduct (Cumming et al., 2015). This is particularly the case as we discover that underwriters who more frequently real-locate shares to retail investors have higher market power.

The remainder of the article is organized as follows: Section 2 defines the paper's testable hypotheses, and Section 3 describes the institutional background. Section 4 presents the sample and methodology used in the hypotheses testing. Section 5 notes the results and provides additional robustness tests. Section 6 concludes.

2. Theory and testable hypotheses

Underwriters are in charge of pricing IPOs, and aim to mitigate adverse selection and moral hazard problems due to the information asymmetries between existing and outside investors. On the one hand, they have incentives for high pricing, not only to please issuers with larger proceeds, but also to induce them to retain their affiliation in future corporate events. On the other hand, investors may become reluctant to interact with an investment bank that systematically overprices IPOs. However, IPO investors are diversified, and include both institutional (informed) and retail (uninformed) investors. Rock's (1986) model describes retail investors as more rationed in "hot" (undervalued) IPOs, compared to "cold" (overvalued) IPOs. Further, retail investors face competition from professional investors in bidding "hot" IPOs, while the same effect is

¹ See http://singaporestockstrading.com/2015/06/13/seven-things-you-should-know-about-singapore-ipos.

unanticipated in "cold" IPOs. Rock (1986) concludes that IPO shares in this model must be underpriced on average, and some funds must be left "on the table" to convince retail investors to join the offering.

We hypothesize that underwriters might deceive retail investors to reduce the amount of money left on the table by announcing an allocation scheme in the IPO prospectus that is later adjusted through reallocation. As retail investors' decisions are based on information released in the IPO prospectus, this allocation scheme is used to estimate the probability of rationing. However, if the allocation scheme is later adjusted, the rationing effect will be different than anticipated. If underwriters aim to attract bids from retail investors, we expect reallocation to the latter to be larger in IPOs with higher valuations relative to their peers. Conversely, undervalued IPOs will attract bids from institutional investors, and underwriters will not have incentives to reallocate shares to retail investors. Based on these arguments, we formulate the following hypothesis:

H1. The higher the valuation of firms going public relative to comparable firms, the larger the reallocation of IPO shares toward retail investors.

Governments and public entities aim to promote investments in equity stock to diffuse the culture of investing in businesses' risky capital in such countries as Italy, where historically investors prefer to invest in less risky assets (Dewenter and Malatesta, 2001; Huang and Levich, 2003). Executives of IPO companies controlled by public entities may also have political objectives, inducing them to leave a "good taste" in retail investors' mouths. Moreover, dispersing IPOs' share ownership among retail investors can indeed garner favor with voters. Jones et al. (1999) clearly indicate that the allocation of shares in privatization offerings is explicitly political, such as with the preferential shares allocated to domestic investors and employees. Bertoni and Giudici (2014) find that the allocation of shares to retail investors in privatization IPOs is seven percent higher than in other IPOs. We posit that the political objectives that characterize privatization IPOs may be met by further increasing the allocation. Therefore, we expect a larger reallocation to retail investors in privatization IPOs because this can further signal good news to entice voters:

H2. The reallocation of IPO shares toward retail investors is larger in privatizations.

Megginson and Weiss (1991) support venture capitalists' "certification" role in IPOs. Their presence reduces information asymmetry and positively signals IPO investors regarding the firm's quality. However, pre-IPO professional investors design their strategies to optimize exit conditions. Cumming (2008) reports that VCs choose IPOs as exit methods when VCs have weak control rights. Lerner (1994) demonstrates that venture capitalists appear to be particularly proficient at timing offerings, as they liquidate their investments as soon as the opportunity arises, and they use both contractual provisions and control rights to ensure that investee firms go public when they perceive it is optimal. They may also accept lower sale prices if the VC fund is close to liquidation, leaving some money on the table (Masulis and Nahata, 2011). Further, they often sell only a portion of their stake in the IPO to provide positive market signals, and not to inflate the supply of shares on the open market (Leland and Pyle, 1977). They subsequently exit the aftermarket when the lock-up provisions expire (Bradley et al., 2001).

Cumming and MacIntosh (2003) indicate that VCs' partial exits from their investment companies deliver higher return rates in IPOs than acquisitions.

We hypothesize that the VCs' presence decreases underwriters' incentives to adjust allocations toward retail investors. First, a professional investor's presence in pre-IPO shareholding should both signal and attract retail investors with a decreased need to rely on reallocation strategies. Second, VC fund partners report to their investors, and the latter could interpret an unexpected shift in IPO shares to retail investors as unfavorable news, signaling scarce interest from professional investors and insufficient effort from VC fund managers. Third, as VCs still prefer to exit the firm in the aftermarket, they would like to avoid any further increase in the allocation to retail investors, and favor allocations to institutional investors, which are typically more long-term oriented. Therefore, we posit:

H3. The reallocation of IPO shares towards retail investors is lower in VC-backed IPOs.

The presence of an underwriter with considerable market power, with other high-quality market participants, makes investors more optimistic about the IPO firm's future prospects (Carter and Manaster, 1990).² Chemmanur and Krishnan (2012) discover that underwriters with greater market power can shift investors' demand by creating positive expectations about the company they take public, thereby increasing their valuations. Further, although many investment banks compete for IPOs, the underwriting industry is best characterized as a series of local oligopolies. Liu and Ritter (2011) model this market as composed of a large number of competitive underwriters, and a small number of underwriters with market power. We argue that oligopolistic underwriters with market power are better positioned to risk their reputations. The likelihood and cost of a reputational hit are expected to be outweighed by the financial benefit to the underwriter. As reported in Migliorati and Vismara's (2014) study of the European IPO underwriter industry, the degrees of "IPO specialization," measured as the ratio between the value of the IPO business (capital raised in IPOs) over the total deal value (equity, loan, bond, and M&A deals) for each underwriter, is quite low for large investment banks. These large, established underwriters, in contrast, typically charge

² The relationships of underwriters with investors has important consequences for IPO performance (Neupane and Thapa, 2013). Su and Bangassa (2011) find little influence of underwriter reputation on the level of IPO underpricing, but a significantly positive relationship between underwriter reputation and the level of IPO long-run performance.

high-dollar commissions as they are matched with IPOs (Tinic, 1988). The relatively low probability of being "punished" from the reallocation of shares as well as the monetary incentive to increase these large IPOs' valuations are expected to outbalance the risk of future market share losses.

H4. The reallocation of IPO shares toward retail investors is larger in IPOs underwritten with higher market power.

Underwriters engage in long-term relationships with professional investors, and their interactions are repeated and reciprocal (Cornelli and Goldreich, 2001). Discretion in allocating IPO shares to institutional investors enhances intermediaries' incentives to win trust, favor, and gratitude by revealing valuable information about the offering (Ljungqvist and Wilhelm, 2002). Therefore, we posit that this reallocation toward institutional investors is associated with superior long-term market performance, relative to the market's benchmark. This suggests that underwriters can select the best performing IPO companies and reallocate a larger fraction of their shares to professional clients (Boehmer et al., 2006). While underwriters in the short-term must convince retail investors to join the offering, they do not want to disappoint professional investors in the long-term. They meet this first objective by intentionally showing biased allocation figures to retail investors. Thus, we posit that:

H5. The reallocation of IPO shares to institutional investors is associated with superior and abnormal long-term market performance.

3. Institutional background

Italy is one country among many that adopted IPO book-building in the 1990s (Ljungqvist et al., 2003). Italian IPOs are typically hybrid offerings, with book-building for institutional investors and an open offer for retail investors. The listing companies select a book-running manager, and the co-managers (if any) assist in marketing the shares. The IPO prospectus vetted by market authorities (CONSOB) discloses the number of shares to be sold, the price range, and the expected listing date. The IPO's retail portion is established by the underwriter in the prospectus as a minimum fraction of the total offering; no requirement exists regarding this portion's minimum or maximum size. The portion of the IPO reserved for institutional investors targets qualified domestic and foreign investors, such as open-end funds, private banks, asset management companies, and financial institutions. As aforementioned, underwriters have the option ("clawback clause") to shift shares from the public to qualified investors, and vice versa. The final offering price may be decided just before or after the retail offering. A maximum binding price must be disclosed to investors before the offer begins in the latter case ('book-building with open price'). If retail investors oversubscribe, shares are allotted to them on a pro-rata basis. No discretion in the allocation of shares is allowed in the treatment of bids from retail investors; the underwriter is allowed to allot fewer shares to retail investors than the minimum number reported in the prospectus only if retail investors undersubscribed to the offering. Conversely, shares are allotted to institutional investors on a fully discretionary basis. Although data regarding the allotment policy is not publicly available, statistics about the total demand from, and the total number of shares assigned to, institutional and retail investors are published in newspapers.³

The roles and services provided by Italy's underwriting syndicate are similar to those in France and Germany (Goergen et al., 2009). The lead underwriter, on which we focus in this paper, is an investment bank that coordinates the entire IPO process and manages the relationships between the issuing firm, stock exchange, and regulatory authorities. Allocation devices, such as overallotment, naked short positioning, and the greenshoe option, are some of the primary options negotiated between the issuer and underwriter, with such ancillary services as price stabilization and liquidity support (Meoli et al., 2015). The overallotment option, an agreement between the issuer and underwriter that allows the underwriter to sell additional shares, is restricted by law at a maximum of 15% of the offered volume by borrowing them from existing (pre-IPO) shareholders. Overallotment can be covered by either returning the corresponding amount of funds (greenshoe) or shares (stabilization) to existing shareholders, or by a combination of the two. The greenshoe, which can be exercised up to 30 days from the beginning of the trading activity, allows underwriters to leave the additional shares on the market and refund them to existing shareholders at the offer price, regardless of current market valuation. Conversely, price stabilization occurs when the underwriter repurchases shares in the aftermarket and returns them to existing shareholders.

The 195 IPOs in the sample were underwritten by 31 different investment banks. Most of the companies were taken public by Italian banks, which underwrite 78% of the IPOs in our sample. Mediobanca is the national leader backing the largest amount of capital raised (\in 27.3 million), while Intesa Sanpaolo underwrites the largest number of deals (49 IPOs, totaling \in 8.1 million). Most foreign banks are large, established investment banks based in the United States. Regarding industry

³ We could not observe ownership at the single institutional investor's level. Shareholders in Italy must disclose only equity stakes in listed companies larger than 2%. We made a check considering a sub-sample of IPOs, and observed that in a very few cases immediately after the IPO, block stakes are owned by institutional investors that are greater than 2%. However, we cannot determine whether such blocks are determined by IPO allocations, or are built during the first days of trading. Similarly, we cannot observe whether institutional investors that receive shares in the allotment phase sell them on the market (and when). Upon interviewing some underwriters, we were told that, if possible, they avoid allocating large numbers of shares to a single investor. Moreover, we were told that banks and asset management companies often bid on shares in the book-building phase for their own investments as well as for their wealthy customers' accounts. These shares will not be relevant for institutional ownership, and we cannot observe them.

distribution, Intesa Sanpaolo primarily takes companies public from the industrial (14 IPOs) and consumer service (12 IPOs) sectors, while the IPOs managed by Mediobanca are more homogeneously spread across industries.

Finally, we note that Italy is currently performing quite well in terms of investor protection. Aussenegg et al. (2016) document that it has the highest insider trading enforcement index within their sample. Cumming et al. (2011) rank Italy among the first countries for trading rule indices. This is related to the latest major regulatory change occurred in 1998, when Italy's legal protections for investors still ranked among the lowest of developed countries (La Porta et al., 1998). The Legislative Decree 58/1998 (the Draghi Reform) represented a "cornerstone" that changed the processes of offerings and takeovers (Cattaneo et al., 2015). Since that, Italian regulation has been driven by demands for the alignment of investor protection to international market standards (Dyck and Zingales, 2004).

4. Sample and methodology

4.1. Sample

An IPO's prospectus reports the number of shares to be allocated to institutional and retail investors. However, the final allocation of IPO shares between these two investor categories can deviate from what is initially reported in the offering prospectus. Further, underwriters have the option to allocate more shares than the initial amount offered (overallotment option), and to assign more shares than initially planned to one category of investors (clawback clause). The final allocation in Italy must be compulsorily published in the country's primary financial newspapers (*Il Sole 24 Ore* and *Milano Finanza*) on the day of the IPO. We take advantage of this disclosure to measure the reallocation of shares. Our sample consists of com-panies that went public on the Italian Exchange in the period from 1997 to 2013, for which we collected data on shares allo-cation. We exclude 3 real estate investment trusts as well as offerings reserved to one class of investors only, which include 13 private placings for institutional investors and 1 offer for subscription to retail investors. The final sample is comprised of 195 IPOs.

4.2. Dependent variables

We introduce the *Prospectus allocation*, namely, the percentage allocation of IPO shares to both investor categories according to the filed prospectus: the percentage of IPO shares allotted to institutional investors equals 100%, minus the percentage of shares initially allotted to retail investors.

We parallel Bertoni and Giudici's (2014) work and define *Reallocation* as the difference between the final and initial amounts of shares allocated to each investor category, as reported below.

$$Reallocation_{i} = \frac{n_{final,i} - n_{initial,i}}{n_{initial,total}}$$
(1)

where the subscript *i* refers to the class of investors considered (either institutional or retail investors); *n* is the number of shares initially meant to be allocated, as reported in IPO prospectuses (*initial*), or the number of shares effectively allocated, as at the end of the offer, after the overallotment option and clawback clause are exercised (*final*). The reallocation is not a zero-sum game, as underwriters can increase the offer by using the overallotment option to allocate more shares to both categories. However, underwriters can allocate relatively more shares to one of the two categories, and most importantly, they can use clawback clauses to directly reallocate the shares initially allocated to a given investor category (e.g., institutions) to another category (e.g., retail).

This paper investigates the determinants of such reallocations (Hypotheses H1, H2, H3, H4) and whether it relates to IPOs' long-term performance (Hypothesis H5) by conducting regressions with dependent variables of *Reallocation* and *BHAR* (buyand-hold returns), respectively. Analyzing BHARs allows us to reduce the right-skewness associated with the distribution of raw returns. These BHARs are calculated as in Loughran and Ritter's (1995) work, by using monthly returns from the beginning of the holding period until the minimum of the end of the holding period or the delisting date, as follows:

$$BHAR_{i} = \begin{bmatrix} \min(T, delist) \\ \prod_{t=1}^{\min(T, delist)} (1 + R_{i,t}) \end{bmatrix} - \begin{bmatrix} \min(T, delist) \\ \prod_{t=1}^{\min(T, delist)} (1 + R_{M,t}) \end{bmatrix}$$
(2)

where $R_{i,t}$ is the return on stock *i* at time *t*, *T* is the time period in which the BHAR is to be determined, and $R_{M,t}$ is the raw return of the FTSE MIB Index (source: Datastream), excluding dividends. As Vismara et al. (2015) note, the holding period begins from the 22nd day of trading, as underwriters in some cases stabilize prices during the first 21 days. As $R_{i,t}$ includes dividends and $R_{M,t}$ does not, the expected *BHAR*_i may be positive rather than zero in an efficient market.

4.3. Independent variables

Hypothesis H1 argues that firm valuation affects the allocation of shares, in that underwriters might reallocate overvalued stocks to retail investors. We investigate this possibility by measuring the valuation of an IPO firm relative to comparable firms. As Paleari et al. (2014) propose, we compare the firm's going public with a group of comparable firms, obtained by

implementing a propensity score-matching model. Although the use of such algorithms allows us to choose comparable firms that are not influenced by attempts to justify a high or low valuation, they do not necessarily select the most appropriate peers as would be chosen by a practitioner or investment banker (Kim and Ritter, 1999). However, this parallels our goal to measure firm valuation as objectively as possible. Specifically, we use a propensity score-matching model to determine up to 10 nearest neighbors from a control sample of all Datastream equities available in each sample year; we then employ a two-step procedure. First, we estimate a logistic regression on a yearly basis, with firm size, profitability, industry, and country dummies as predictive variables. We then match treatment units from the IPO sample with control units from Datastream based on the logistic regression's propensity score, or fitted value. We use the caliper approach with a maximum tolerance of 0.01 for score distance to avoid any risk of bad matching, and discard any control company with a score outside the range exhibited by IPOs (common support criterion). Thus, the neighbor's score must be the closest to the IPO score, distant by no more than 0.01, and inside the range of scores associated with the reference sample. We then calculate the average price-to-book ratio on the day of the offer for the resulting set of comparable firms for each IPO firm in our sample. *Valuation* is defined as the ratio between the market capitalization of IPO firms at their offer prices and the equity value, estimated by multiplying the IPO firm's equity book value by the average price-to-book of its comparable firms.

Hypothesis H2 is tested by introducing a variable *Privatization*, a dummy variable assuming a value of 1 if the IPO is privatized (i.e., the controlling shareholder is the government or any public entity). The variable *VC_backed* is also included to test Hypothesis H3; this is a dummy variable that equals 1 if venture capitalists or other professional investors are among pre-IPO shareholders. Further, VC-backed IPOs could be associated with higher long-term returns (Brav and Gompers, 1997). Finally, *Underwriter Market Share* acts as a proxy for investment banks' market power. This is measured in terms of the capital raised in European IPOs from 1995 to 2013, and equals 1 for the underwriter with the highest market share. The data is obtained from the work of Vismara et al. (2015).

4.4. Control variables

Underwriters incur fixed costs in placing small IPO companies, which may influence their placement strategies. Large firms are then typically found to underperform more than smaller firms in the long-term (Fama and French, 1993). Therefore, we control for the company's size (*Assets*), namely, the log of the consolidated assets' accounting value. Further, the IPO company's profitability should influence both the allocation process and long-term returns. Shares placed by the most profitable companies should be associated with negative revisions of the allocation to retail investors because underwriters want to attract their attention. Current profitability is often found to correlate with future market returns (Bonardo et al., 2011). Thus, we use the return-on-assets ratio (*ROA*) from the pre-IPO balance sheet as a proxy for firm profitability. We control for the shares' demand by introducing the IPO oversubscription, specifically, the number of shares that the two investor groups request, compared to the initial expected allocation (*Oversub_Institutional* and *Oversub_Retail*). When demand for shares from one investor category is large, we anticipate that underwriters will reallocate more shares to that group.

Allocation choices and long-term returns could also depend on the offering's characteristics and the amount of primary and secondary shares offered. Namely, we can anticipate a higher separation of ownership and control the larger the proportion of secondary shares offered, relative to pre-IPO outstanding shares (namely *Participation*). This leads to poorer long-term returns (Jensen and Meckling, 1976; Leland and Pyle, 1977) and to a larger allocation of shares to institutions, to favor the formation of block holdings and avoid future takeovers. These may be more successful if a large fraction of the equity capital is dispersed among retail investors. The primary shares issue allows the IPO company to raise capital, and this effect (measured by *Dilution*, the ratio between newly issued shares and pre-IPO outstanding shares) may harness valuable future growth opportunities that influence both the long-term returns and the allocation process.

Aggarwal (2003) posits that the underwriter's quick access to marketing channels through retail investors may affect both the allocation process (the cost to reach retail investors should be larger) and the long run returns (underwriters should be less able to favor only institutional investors).

We focus on the determinants of long-term market performance and include the issuing firm's market-to-book (M/B) ratio (*Market_to_book*) as a proxy for growth opportunities. Low M/B firms tend to outperform their counterparts on average (Fama and French, 1993). On the other hand, Loughran and Ritter (2000) argue that firms may actually go public to time the market and exploit unusually high market valuations. Thus, firms with significant growth opportunities could actually underperform in the long-term.

Many firms listed in the early 2000s experienced poor returns in the aftermarket as a consequence of the bursting technology bubble (Loughran and Ritter, 2004). Therefore, we add a dummy variable that assumes a value of one if the firm went public in the period from January 1999 to April 2000 (*Bubble 1999_2000*). Further, we control for market timing by considering market momentum (*Momentum*), which is measured by the Italian Exchange's general index return in the six months preceding the IPO. Firms may decide to go public when average market returns are unusually large and investors' confidence is high (Krigman et al., 1999).

Finally, we include the leverage of the IPO firm, computed as the ratio between the book value of financial debts at the time of the IPO and market capitalization at the IPO offer price (*Leverage*). Financial leverage is a proxy for the company's riskiness, as higher leverage leads to higher uncertainty (Eckbo and Norli, 2005). Thus, we anticipate a negative correlation between leverage and long-term returns.

Table 1

Descriptive statistics.

Variable	Obs	Mean	Median	Std. dev.	Min	Max		
Dependent variables								
Prospectus_allocation (Institutional)	195	0.733	0.750	0.105	0.333	0.900		
Reallocation (Institutional)	195	0.045	0	0.147	-0.594	0.279		
Reallocation (Retail)	195	0.048	0	0.121	-0.170	0.742		
BHAR (one year)	193	0.033	-0.161	0.756	-0.976	4.572		
BHAR (three years)	191	-0.183	-0.347	0.406	-1.627	3.022		
BHAR (five years)	189	-0.367	-0.253	0.734	-1.874	2.941		
Independent variables								
Valuation	195	6.076	1.997	8.777	0	30		
VC_backed	195	0.410	0	0.493	0	1		
Privatization	195	0.107	0	0.311	0	1		
Underwriter Market Share	195	0.283	0.216	0.637	0	1		
Control variables								
Assets (in millions \in)	195	1,440	113	8.23	0.6	97,200		
Bubble 1999_2000	195	0.241	0	0.429	0	1		
Dilution	195	0.294	0.251	0.307	0	3.166		
Leverage	195	0.143	0.092	0.165	0	0.898		
Market_to_book	195	4.889	2.155	11.223	0.167	92.118		
Momentum	195	0.554	0.524	0.112	-0.203	0.794		
Oversub_Institutional	195	6.285	3.240	8.820	0.301	74.122		
Oversub_Retail	195	9.055	3.860	25.072	0.320	311.989		
Participation	195	0.199	0.175	0.027	0	0.650		
ROA	195	0.129	0.121	0.128	-0.713	0.618		

Descriptive statistics about the sample characteristics.

4.5. Descriptive statistics

Table 1 illustrates our sample's descriptive statistics, while Appendix A displays the pairwise correlation matrix. We begin with the variables directly linked to our research questions. The *Reallocation* variables described in the previous para-graph on average equal to +4.5% for institutional investors and +4.8% for retail investors. Therefore, the offer size increases in most cases, and more shares are assigned to both groups. Moreover, we have several cases in which fewer shares are allotted than expected. The buy-and-hold abnormal returns (*BHAR*) are negative after three and five years, on average. The standard deviation is quite large, and although the median values are negative, some companies strongly outperform the market index.

The median value of the consolidated *Assets* of the firms in our sample equals \in 113 million, while the *Dilution* variable signals that the average ratio between newly issued and outstanding shares is 29.4%. The dummy variable *Bubble* 1999_2000 indicates that 24% of the IPO companies were listed during the dot.com bubble. The average *Leverage* ratio equals 0.143. The *Market_to_book* ratio of newly listed companies (computed through the relative to the mid of the prospectus offer's price range) is 4.889 (maximum 92.118). Therefore, newly listed firms are priced with positive growth expectations. The country index return in the six months preceding the IPO (*Momentum*) is positive (+55.4% on average). Further, retail investors' *Oversubscription* is larger than institutional investors' (9.055 versus 6.285, on average), but its standard deviation is much higher (25.072 versus 8.820). The average *Participation* ratio equals 19.9%; *Privatization* IPOs represent 10.7% of the sample.

According to the *Prospectus_allocation* published in the IPO prospectus, institutional investors on average are expected to subscribe a larger fraction of the offering (73.3%) compared to retail investors (the remainder, or 26.7%). The average returnon-assets (*ROA*) ratio before the IPO equals 12.9%, and 41% of the sample IPOs are VC-backed (or the *VC-backed* variable). Our analysis considers not only venture capitalists, but also private equity investors, closed-end funds, and banks for an IPO to qualify as "venture-backed."

4.6. Methodology

We run a panel of regressions to test our Hypotheses 1, 2, 3, 4. These two variables are not complementary, as the greenshoe and the clawback options deliver underwriters the opportunity to both increase their quantity of shares and switch their destination between retail and institutional investors.

We test Hypothesis 4 through a simple OLS model, in which the dependent variable is the BHAR at various points in time after the IPO: one, three, and five years.⁴

⁴ The pairwise correlation reported in Appendix A demonstrates that multicollinearity should not be a problem in our regressions.

5. Results

Table 2 reports the regressions' results, in which the dependent variables are the initial *Prospecuts_Allocation* to institutional investors (the expected allocation to retail investors is the complement to 100%) and the *Reallocation* to both retail and institutional investors. The reallocation to retail investors positively correlates with the overvaluation measure, supporting our Hypothesis H1. Retail investors are allocated more shares than initially expected in overvalued IPOs, and fewer shares than expected in undervalued IPOs. Hypothesis H2 is also validated. Retail investors in privatized IPOs are reallocated more shares than initially expected, and institutional investors are reallocated fewer shares. This evidence is consistent with underwriters' gauging of political objectives in reducing the rationing effect for small investors. Despite the initial allocation to retail investors is significantly larger in privatized IPOs, in bookbuilding of the average privatization 10% of the shares are reallocated to retail investors. Finally, the reallocation of shares to retail investors is lower in VC-backed IPOs, supporting our Hypothesis 3. We confirm that, as hypothesized in H4, larger reallocations of IPO shares occur in offerings underwritten by large investment banks, as the variable measuring the underwriter's market share is significantly positive.

We find regarding the control variables that the shares of less profitable IPO companies, or those with poor return-onassets indexes, more easily "shift" to retail investors, which further confirms the misconduct towards small investors. Table 2 also predictably indicates that the oversubscription ratios positively correlate with reallocation in favor of the same investor group, and negatively correlates with that of the other investor group.

Table 3 illustrates the determinants of long-term buy-and-hold abnormal returns, and considers returns for one, three, and five years. Institutional investors are favored through a larger allocation in the best-performing IPOs, as we discover a significantly positive coefficient for reallocations toward institutional investors. This effect is of considerable economic significance. A 10% increase in the reallocation to institutional investors leads, on average, to an 25% increase in the performance over three years after the IPO.

The Valuation variable negatively correlates with the long-term market performance in all specifications. This noteworthy result emphasizes that overvaluing IPO companies leads to poorer long-term returns compared to the companies' peers. Further, the participation ratio positively correlates with subsequent market performance after two and three years; the fewer shares that pre-IPO shareholders retain at the IPO, the better the long-term returns. This result contrasts with the works of Jain and Kini (1994) and Mikkelson et al. (1997) for the United States market, who discover that the higher the insider retention of shares, the better the long-term returns. However, this result is in accord with the work of Ljungqvist (1997), who studies German IPOs in a context more similar to the Italian financial market, and instead discovers a negative correlation.

	Prospectus_allocation (Institutional)	Reallocation (Retail)	Reallocation (Institutional)
Valuation	-0.131	0.165**	-0.170 [*]
	(0.085)	(0.078)	(0.099)
VC_backed	-0.015	-0.036**	0.010
	(0.016)	(0.015)	(0.018)
Privatization	-0.060**	0.102	-0.081****
	(0.025)	(0.023)	(0.029)
Assets	-0.006**	0.002	-0.001
	(0.003)	(0.003)	(0.004)
Participation	0.102**	0.063	-0.016
	(0.052)	(0.047)	(0.060)
Dilution	0.001	-0.014	0.036
	(0.019)	(0.025)	(0.031)
Underwriter Market Share	-0.213	0.379**	-0.587^{*}
	(0.241)	(0.177)	(0.350)
ROA	-0.012	-0.103**	0.018
	(0.058)	(0.054)	(0.068)
Oversub_Institutional		-0.075***	0.098***
		(0.009)	(0.011)
Oversub_Retail		0.058	-0.044
		(0.007)	(0.009)
Constant	0.859	-0.020	-0.091
	(0.065)	(0.064)	(0.081)
Adjusted R2 (%)	9.64	10.41	10.53
Number of Observations	195	195	195

Table 2

Equation regression.

The three equations' dependent variables are the allocation to institutional investors at the prospectus, the reallocation to retail investors after bookbuilding, and the reallocation to institutional investors after the book-building. Standard errors are reported in parentheses. Sample: 195 IPO firms listed on the Italian Exchange in the period 1997–2013.

* Significance at the 10% level.

** Significance at the 5% level.

*** Significance at the 1% level.

Table 3 Determinants of buy-and-hold abnormal returns.

	BHAR 1y	BHAR 1y	BHAR 3y	BHAR 3y	BHAR 5y	BHAR 5y
Valuation	-1.038**	-1.079***	-0.855**	-0.879**	-0.978^{**}	-1.016**
	(0.408)	(0.410)	(0.371)	(0.371)	(0.412)	(0.418)
VC_backed	-0.015	-0.005	-0.060	-0.064	-0.143	-0.147
	(0.130)	(0.138)	(0.094)	(0.098)	(0.100)	(0.103)
Privatization	-0.055	-0.073	-0.088	-0.076	-0.006	0.011
	(0.166)	(0.175)	(0.149)	(0.157)	(0.181)	(0.172)
Assets	-0.030	-0.032	0.046	0.047	0.041	0.042
	(0.028)	(0.029)	(0.033)	(0.033)	(0.036)	(0.037)
Participation	0.216	0.207	0.866	0.861	1.105	1.095
	(0.423)	(0.429)	(0.360)	(0.362)	(0.426)	(0.429)
Dilution	0.117	0.091	-0.016	-0.030	-0.115	-0.141
	(0.128)	(0.128)	(0.147)	(0.149)	(0.183)	(0.186)
ROA	0.160	0.152	0.192	0.163	0.337	0.298
	(0.293)	(0.296)	(0.197)	(0.202)	(0.258)	(0.268)
Prospectus_allocation	0.066	0.184	0.457	0.551	-0.206	-0.039
	(0.583)	(0.590)	(0.403)	(0.421)	(0.499)	(0.509)
Reallocation (Institutional)	0.586		0.342**		0.605	
	(0.273)		(0.169)		(0.290)	
Reallocation (Retail)		-0.116		-0.255		-0.364
		(0.371)		(0.349)		(0.414)
Market_to_book	-0.268	-0.212	-0.410^{**}	-0.381**	-1.006	-0.949***
	(0.692)	(0.673)	(0.171)	(0.176)	(0.324)	(0.329)
Leverage	0.591	0.628	-0.473	-0.475	-0.595	-0.588
	(0.574)	(0.579)	(0.302)	(0.304)	(0.338)	(0.349)
Bubble 1999_2000	0.440	0.459	0.054	0.070	-0.154	-0.128
	(0.188)	(0.193)	(0.134)	(0.137)	(0.135)	(0.139)
Momentum	-89.810	-84.989	-1.417	2.011	45.664	51.426
	(44.233)	(43.614)	(34.590)	(35.303)	(46.847)	(48.207)
Constant	0.370	0.320	-1.454	-1.523	-0.965	-1.092
	(0.697)	(0.708)	(0.734)	(0.755)	(0.823)	(0.836)
Adjusted R ² (%)	13.0	11.9	14.2	13.8	19.8	18.8
P-Value F-test	0.001	0.001	0.000	0.000	0.000	0.000
Number of Observations	193	193	191	191	189	189

Sample: 195 IPO firms listed on the Italian Exchange in the period 1997-2013. Standard errors are reported in parentheses.

Significance at the 10 level.

** Significance at the 5% level.

*** Significance at the 1% level.

The market-to-book ratio also significantly and negatively correlates with performance after two and three years, consistent with the work of Fama and French (1993). Pre-IPO market returns negatively correlate with abnormal performance at 12 months.

5.1. Robustness tests

We test our results' robustness by using an alternative variable to compute the overvaluation (or undervaluation) of IPO shares, namely, the offer price to the intrinsic value based on a residual income model, similar to Ohlson's (1990) work. We find that the results do not appreciably change by introducing this valuation model, and the relationship observed in the previous sections still remains valid.

6. Conclusions

Academics have long studied IPO pricing, but current literature on this topic has primarily focused on price revisions and their relationship with underpricing, a short-term reward for the truthful revelation of private information during the bookbuilding phase (Benveniste and Spindt, 1989; Hanley and Wilhelm, 1995). Few studies address the long-term implications of allocation policies. Boehmer et al. (2006) find that, on average, institutional investors are allocated a larger fraction of the offerings in IPOs that exhibit higher long-term returns. Recently, Boreiko and Lombardo (2011) and Bertoni and Giudici (2014) analyzed the adjustment in the allocation of shares to different categories of investors involved in an IPO, from the prospectus to the offering date, and discovered that the "reallocation" of IPO shares to institutional investors is an alternative and complementary mechanism to the partial adjustment of the IPO price to reward institutional investors.

However, none of the above studies have addressed the relationship between allocation strategies and IPO valuation, or have analyzed the long-term implications from this relationship. We fill this gap in literature with this paper by using a sample of 195 IPO firms listed on the Italian Exchange in the period from 1997 to 2013 to analyze the relationship between IPO valuation and strategic allocation choices. We employ two different models to estimate the IPO firms' intrinsic equity value by exploiting information stemming from the valuations of comparable companies as well as accounting data. We discover that retail investors receive more shares than expected in IPOs priced farther from their intrinsic values, while these are more highly rationed in "cheaper" IPOs. We argue that this is a deliberate underwriting strategy. Retail (unin-formed) investors are rationed in "hot" IPOs, and they face an adverse selection problem: the probability of being allotted overvalued shares is greater than the probability of being allotted undervalued shares due to competition from professional (informed) investors' participation, but they adjust this proportion by revising the allocation upwards or downwards. Such misconduct raises retail investors' expectations regarding average returns, and allows the underwriters to gain a more substantial contractual power over institutional investors. We test this strategy's long-term outcomes by analyzing whether these reallocation strategies correlate with long-term returns, and find that the most overvalued IPOs underper-form in the long-term. Further, institutional investors are favored in the revision of allocations for IPO shares that will perform better.

Our analysis indicates that underwriters systematically increase the allocation of shares to retail investors in overvalued IPOs, and increase the allocation of shares that will perform better in the future to institutional investors. It can be argued that the revision is conditional upon underwriters' discovering of new market information through book-building, but we emphasize that our valuation model is built considering variables that are already known before the offering. Therefore, we are convinced that the reallocation is due to a misconduct effect: underwriters initially want retail investors to believe that the rationing effect will be less relevant, but they then adjust allocations to decrease the probability that retail investors are real-located more shares, while reallocation is less likely in VC-backed IPOs.

We believe that some changes in the allocation rules could alleviate the moral hazard problem for retail investors. First, private placements to institutional investors could be separated from the public offering, with no opportunity to exploit the clawback option, which allows the supply to change to one category of investors "shifting" shares to the other. However, this solution hurts the flexibility in the IPO process. Alternatively, the offer to retail investors could be organized after the private placement closes so small investors can know exactly the price and quantity of shares upon which they can bid. It is noteworthy that some IPOs in the United Kingdom include an "automatic" clawback provision triggered by retail demand. Essentially, such provisions enable retail investors to condition their demand on feedback received from institutional investors.

In conclusion, our findings are puzzling regarding retail investors' participation in the IPO game. Deceit in a repeated game setting would amplify the winner's misfortune. Thus, why would retail investors continue to participate, knowing (or learning over time) that they are being deceived? Rock's (1986) model offers a possible explanation, as it considers that IPOs' initial returns are not significantly underpriced when taking into account the probability of retail investors being allocated IPO shares (meanwhile, the initial returns' simple mathematical average is positive). This is confirmed in the Italian market, as Bertoni and Giudici (2014) note that Italian IPOs' mean initial returns equal 12.01%, but does not significantly differ from zero if the returns are weighted by the probability of demand satisfaction. Therefore, under-pricing could serve as a mechanism for uninformed investors to bid in IPOs. Although retail investors eventually learn that they tend to be rationed in receiving better IPOs and would conversely receive more shares in inferior IPOs, the aver-age positive underpricing might provide compensation to these retail investors. However, their incentive would involve divesting soon after the IPO. Therefore, our framework also contributes by explaining why IPOs, on average, are underpriced.

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Appendix A. Pairwise correlation matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
(1) Reallocation (Institutional)	1.000																			
(2) Reallocation (Retail)	-0.658	1.000																		
(3) BHAR (one year)	0.123	-0.032	1.000																	
(4) BHAR (three years)	0.073	-0.017	0.436	1.000																
(5) BHAR (five years)	0.089	-0.010	0.324	0.764	1.000															
(6) Valuation	-0.052	0.042	-0.150	-0.167	-0.157	1.000														
(7) Underwriter Market	0.311	0.414	0.201	0.231	0.297	0.313	1.000													
share																				
(8) Assets	-0.067	0.138	-0.003	0.095	0.094	-0.194	0.412	1.000												
(9) Bubble 1999_2000	0.040	0.066	-0.195	-0.015	-0.104	0.057	0.002	0.034	1.000											
(10) Dilution	-0.064	-0.057	0.019	-0.139	-0.197	-0.025	0.012	-0.216	-0.097	1.000										
(11) Leverage	0.055	-0.061	-0.125	-0.008	-0.021	-0.266	0.174	0.374	-0.116	-0.052	1.000									
(12) Market_to_book	0.089	-0.060	-0.096	-0.131	-0.212	0.096	0.286	-0.198	0.174	0.108	-0.139	1.000								
(13) Momentum	0.057	-0.006	-0.150	-0.022	0.069	0.063	0.223	-0.051	0.068	-0.006	-0.127	0.071	1.000							
(14) Oversub_	0.467	-0.228	0.094	0.027	0.038	0.096	0.116	-0.081	0.274	-0.211	-0.086	0.212	0.302	1.000						
Institutional																				
(15) Oversub_Retail	0.106	0.197	0.132	-0.032	-0.040	0.024	0.142	-0.093	0.367	-0.080	-0.143	0.201	0.376	0.644	1.000					
(16) Participation	0.024	0.012	0.040	0.287	0.317	-0.118	-0.192	0.174	0.010	-0.366	0.024	-0.137	-0.007	0.001	-0.131	1.000				
(17) Privatization	-0.118	0.274	-0.013	0.007	0.049	-0.066	0.371	0.343	0.075	-0.167	0.139	-0.080	-0.094	0.066	0.059	0.141	1.000			
(18) Prospectus_allocation	0.107	-0.013	-0.070	0.105	0.064	-0.077	0.283	-0.181	-0.421	0.018	0.090	-0.102	-0.172	-0.129	-0.1	0.092	-0.220	1.000		
(institutional)																				
(19) ROA	0.0262	-0.108	0.019	0.108	0.157	-0.091	0.185	-0.063	-0.405	-0.158	-0.083	0.017	0.069	0.059	0.045	0.187	-0.005	0.041	1.000	
(20) VC hashed		0 4 9 0	0.045	0.005	0.005	0.004	0.040	0.070	0.004	0.004	0.050	0.040	0.007	0.050	0.055	0 200	0.045	0.005	0.005	1 000

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