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ABSTRACT

This paper provides an economic model resulting in two distinct marketing strategies available to investment bankers. First, we hypothesize that an increased selling effort by brokers is used most effectively when the investment clientele is uninformed. Second, adjusting the offer price of the issue is hypothesized to be employed primarily in large IPOs with a clientele of sophisticated investors, consistent with Shiller's Impresario Hypothesis. Our pre-IPO bubble (1981-1996) empirical results yield evidence supporting both selling mechanisms. Under-demanded small IPO issues are 'pushed' by the brokers, while some under-demanded large IPO issues instead increase the offer price, with large first-day turnover characteristics of flipping. Both types of issues experience large and significant negative long-term returns, as share prices eventually return to the equilibrium price. For the post-IPO bubble period (1997-2017), the Impresario Hypothesis is empirically supported, but the push strategy is not, indicating a partial shift in selling mechanisms post bubble.

Keywords: Initial Public Offering; IPO; Selling Strategies; Underpricing
JEL Classification: G24; G30; G32; G40

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I. Introduction and Literature Review

This paper contributes to our understanding of why buyers of assets would sometimes pay too much, well in excess of the assets' eventual worth, i.e., irrational exuberance. The pricing of IPOs seems to be fertile ground for such a study, as it is commonly known that investors in general pay too much for IPO shares at the offer, or at the end of first day, in comparison to their eventual long-term equilibrium prices.

In this study we uncover evidence that supports two plausible explanations on how such demand could be created. An important implication of both explanations is that they show that some markets may still exist even when certain key components, such as the presence of rational and informed buyers, and reasonable information costs concerning the quality or value of an asset, are absent. One explanation applies to small markets, such as that for small IPO issues. Here, the buyers are almost exclusively small investors as it is prohibitively expensive for sophisticated investors to acquire information, relative to the amount that these investors can invest (Benson, Brau, Cicon, and Ferris, 2015). We show that an effective mechanism to create excess short-term demand is to provide greater incentives to the selling agents, such as the stockbrokers, to 'push' the shares to the unsophisticated small investors. Since the demand these shares are dictated by the selling agents to the

unwary, in the market parlance, these shares are 'sold' to the uninformed investors, and not 'bought' by them (Ang and Brau, 2003).

In the second explanation, we are also able to show, among large IPOs, underwriters can induce sophisticated and informed large investors to rationally participate in overpriced IPOs. Informed investors need not be long-term investors. They may rationally decide to subscribe or take up their normal allocation of IPO shares at the offer price (Jenkinson, Jones, and Suntheim, 2018), even if they are aware of overpricing, as long as the expectation of being able to sell for a quick profit shortly after issue is high, i.e., a practice commonly known as flipping (Krigman, Shaw and Womack, 1999; Brau, Li, and Shi, 2007).

In prior literature, much work has been conducted to investigate the market performance of IPOs. This aftermarket performance has been divided into two primary areas of study -- the initial price performance (i.e., known most commonly in the literature as underpricing, Brau, Cicon, and McQueen, 2016) and the long-run performance of IPOs. Both the initial and long-run IPO performance literature is filled with theories pertaining to why we observe the various return patterns of IPOs (Brau and Fawcett, 2006). One area that has not yet been thoroughly analyzed in this line of literature is the marketing of IPOs, including an analysis of clienteles' specific marketing mechanisms, and their consequences on short and long-term market prices.

In a firmly underwritten IPO, the underwriter is compensated by buying the securities at a discount from the final offer price (Ang and Brau, 2002). This discount is termed the gross spread and for typical issues is usually 7% (Uttal (1986), Smith and Dwyer (1998) and Chen and Ritter (2000)). This spread is divided into the underwriter fee, the management fee, and the selling commission. Typically, 20% of the gross spread is allocated to the underwriting syndicate, 20% to the managing underwriter, and 60% as a selling concession allotted to underwriters based upon the portion of the IPO sold (Bialkin and Grant (1985)).

Within the selling concession portion, brokers and dealers who are employed to sell shares of the IPO to investors receive a portion known as the reallowance fee. Unlike the mostly fixed underwriting, management, and selling concessions, we document considerable variability in the reallowance fees given to the selling brokers as incentive to market the issues. Our empirical analysis consists of two sample periods: the pre-IPO bubble (1981-1996) when access to information and IPOs were a boom, and a post-IPO bubble sample (1997-2017).

We test the 'push' created demand hypothesis that artificial excess demand could be induced by the effort of the selling agent. Specifically, we examine the empirical predictions that, for small IPOs, more intense selling efforts cause: (i) higher initial first day price but (ii) that are completely offset by losses in subsequent long-term market performance of the IPOs.

The marketing literature documents that different selling mechanisms are more effective depending on the clientele. Within the IPO markets, the two major groups of clienteles are institutional investors (i.e., sophisticated) and retail (i.e., individual or non-sophisticated). It is reasonable to expect retail investors, being not as sophisticated as institutional investors, are more likely to be swayed by the selling efforts of brokers and dealers (Chemmanur, Hu, Huang, 2010; Gibbs, 2018; Baxamusa and Jalal, 2018).

It follows that issuers and their investment bankers may choose to depend more heavily upon dealers and brokers to sell IPOs to their retail clientele. Thus, it is predicted that IPOs dominated by retail investors (i.e., very small IPOs) will rely more on selling effort via reallowance incentive. In particular, retail brokers and dealers will be employed most frequently when an IPO is under-demanded. (If the IPO has a strong initial demand then there is no need for investment banks to give dealers and brokers a larger piece of the pie.) That is, these issues will be "pushed" by the brokers. As such, those small IPOs that must be pushed into the market will on average be inferior IPOs. If dealers

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and brokers are effective in their selling effort, however, they can cause inferior IPOs to be in temporary artificial high demand, as reflected in high initial returns. Ultimately over time however, the true worth of these IPOs will be revealed and they will perform poorly over the long run.

When analyzing small firms in the pre-IPO bubble sample, we find that the results confirm these predictions. A portfolio of the smallest IPOs that are in the top third of reallowance experience nearly a 44% first day return followed by a -33% three-year return. If a compounded return is calculated, the result from the offer price to the end of the third year is a net loss of –3.5%. In other words, retail investors who managed to obtain an allocation at the offer price still overpaid by 3.5% on the average. However, retail investors who bought the shares after offer, fare even worse, they overpaid 48% on the average in the first day. It does appear that selling brokers are able to temporarily mislead some unsophisticated small investors to buy inferior issues. In contrast, small issues that are not pushed into the market do not fare as poorly, they under perform a characteristic matched control sample by only 3% (versus –33% reported above) over a three-year holding period. (i.e., The first day closing value of 1 share is 1*(1+0.44) = 1.44. The subsequent 33% decrease in value results in the value of 1 share of 1.44*(1-0.33) = 0.965. Thus, the stock has decreased in value by 3.5 percent.)

Institutional investors, whose demand makes up the lion's share of initial allocation for IPOs, are not expected to be influenced by the high-pressure selling tactics of dealers and brokers. However, they would knowingly subscribe to overpriced issues only if they could realize a quick profit. Thus, it would be rational for the large investors to take up their allocation, if their participation could help create an appearance of excess demand which in turn raises the expected profit from flipping (Krigman, et al., 1999). This explanation is related to the Impresario Hypothesis for IPO pricing proposed by Shiller (1990). Shiller suggests an intentional pre-offer underpricing, and a subsequent offer price increase could generate excitement for the IPOs, thus, resulting in further first day price increase. We refine the Impresario Hypothesis by incorporating flipping as a necessary condition and show that it could be supported by rational large investors.

In this paper we document evidence in support of this variant of the Impresario Hypothesis for both the pre- and post-IPO boom samples. First, we find large IPOs are more likely than small IPOs to increase offer prices. The finding is consistent with the prediction of the Impresario Hypothesis, in which an initial low offer price is increased to cause the unsophisticated small investors to believe that demand for the share is unusually high. Large, institutional investors rationally accept their normal allotment of shares, as they expect to profit from higher post offer market prices, partly due to their action that helped create the high-perceived demand. The rationale of these large investors is similar to the classic "Beauty Contest" of Keynes (1936). Specifically, sophisticated investors with allocations buy shares based on what they perceive unsophisticated investors will currently pay for the shares. Thus, in Keynesian terminology, sophisticated investors judge not what they perceive to be the eventual winning IPOs, but they judge what they feel others (small investors) will judge, taking into account their actions to subscribe, as the immediate winning IPOs. This conjecture is rational if large investors expect to take short-term profit or flip.

We also provide supporting empirical evidence for the hypothesis' two related predictions: that large IPOs with the largest pre-offer price increases are associated with high first day initial returns and subsequently experience the worst long-run performance. For the portfolio consisting of the largest IPOs and the highest price adjustments (i.e., increased offer prices), the one-day return is nearly 14% whereas the three-year abnormal return is -18% based upon characteristic matched benchmarks, resulting in a net return of –7%. These are clearly overpriced IPOs, even at the hard to get subscription offer price, issued mostly to large investors. Nevertheless, it provides evidence that overpriced or inferior IPOs are bought by the large investors, as they could realize a one day flipping profit of 14% on the average. Our empirical result questions the partial adjustment interpretation of IPO prices at

offer by Hanley (1993), which do not take into account of the fact that large investors can and do flip for short-term profit. Interestingly, we only find empirical support for the Impresario Hypothesis as a relevant factor for the post-IPO bubble sample.

The remainder of this paper is as follows. In Section 2, the theoretical underpinnings for the study are outlined. Section 3 discusses the sample selection and sample characteristics. Section 4 documents IPO selling efforts and its relationship with initial and long run performance. In Section 5, IPO offer price adjustments are discussed as a possible marketing technique. In Section 6, regression models are estimated to determine the impact of offer price adjustments and selling effort on short- and long-term prices, while controlling for other relevant variables. Section 7 summarizes and concludes.

II. Theoretical Development

In this section, we develop the theoretical framework for the two mechanisms in which an artificially high demand for capital asset could be created, in which buyers paying way too much could be observed. The foundations underlying the mechanisms are first described, and a more formal treatment is given later.

A. Background and Assumptions

Let there be two types of investors. Informed investors are defined as sophisticated investors who pay to acquire information pertaining to the IPO firm. In this paper we refer to this type of investor interchangeably as informed, sophisticated, or institutional. Although informed investors pay to be well informed, they are not perfectly informed. They know their own estimate for the value of the issue with certainty; however, they do not know the demand of all other investors. In contrast to informed investors, uninformed, unsophisticated, or retail investors are less capable to acquire or utilize information which is due to their lack of time, resources, analytical ability, and the high cost of information relative to the size of their investments. Thus, they are more likely to depend upon third parties such as brokers and dealers for information.

Defining these two types of investors allows us to identify the clienteles associated with two IPO markets based on the size of the issue. Large issues are those IPOs that attract the attention of both large and small investors. Small issues are those that attract mainly (if not exclusively) small retail investors. Large investors would not participate in issues of small IPOs, as it is too costly for them to acquire the necessary information about small IPOs relative to the dollar size of purchase they can reasonably make. Since it must necessarily follow that the acquisition and analysis of relevant information on the small issues by non-sophisticated investors should be even more expensive, thus, small IPOs may not have a market if all small investors were to acquire the same high-quality information demanded by the sophisticated.

B. The 'Push' created demand hypothesis

Small investors cannot afford the resources to acquire information about shares. They are also less likely to invest in human capital to become sophisticated. Thus, many small investors, realizing they are uninformed and unsophisticated, do not invest directly. Some, however, miscalculate their ability to acquire and process information. Instead, they rely too much on low cost but unreliable sources of information, such as broker's supplied news. Consequently, these investors form expectations of share prices that are based on noisy, possibly biased, if not outright misleading information. The seller's agents, who are usually the supplier of these information, have to expend marketing resources. The less likely some manufactured news is to be believed, in which fewer persons

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are expected to buy the story, then the more the efforts are needed to 'push' the shares to the unwary. The specific forms of effort costs that are increasing with the unreliability of information are: (i) making more cold calls by the brokers, (ii) mobilizing more salespersons, and (iii) taking more time to convince each client. Higher marketing efforts, or 'push' should cause the selling brokers to demand greater compensation. Thus, our testable hypothesis in the case of a 'push' created demand is that the more an issue is overpriced, the greater is the selling effort needed. Observationally, a direct correlation between the overpricing of the issue is predicted. A related prediction is that since issues that must be 'pushed' into the market are overpriced, their market prices will eventually suffer large long-term losses.

The necessary condition for this type of market to exist is the lack of informed investors who could have defeated, e.g., by selling short, the push generated artificial excess demand. Thus, the hypothesis is applicable only to small IPOs, shunned by large investors due to high information acquisition costs relative to the dollar size of their investments.

C. The Impresario Hypothesis

Recall the two types of investors. The large and sophisticated who may choose to be informed at a cost, and the small and unsophisticated who cannot afford to pay for information, nor are capable of processing it. The latter would base their expectations partly on their perceived aggregate demand for shares. Having not invested in information, these small, unsophisticated investors could form their perception of the pre-offer aggregate demand by other investors for an IPO to be based on observable external indicators. These indicators may take the form of observing: 1) pre-offer price adjustment made by the underwriter, upward or downward, in the offering price, 2) the proportion of shares 'take up' by the large, institutional investors, and 3) other scarcity indicators, including their own experience in attempting to get an allocation at the IPO offer price.

The sophisticated are aware of how the uninformed form expectations of aggregate demand. They also understand that any attempt by the underwriters or issuers to create the appearance of excess demand could produce a cascade like effect on the uninformed, causing the market price to be further away from equilibrium price. These expectations of the sophisticated along with the fact that they can: 1) receive allocation of IPO shares at the offering price, and 2) be able to quickly resale to the uninformed at a higher price due to a first day run-up by the uninformed, make them willing to buy shares at any price-- below, at, or higher than their long run prices. After all, it is a wealth maximizing rational behavior.

The scenario outlined is best described by the Impresario hypothesis. To verify the hypothesis, we examine its testable implications: (1) the initial offering price of IPO may be set below its long run equilibrium price, (2) the offering price adjustment affects the first day price change, i.e., the cascade effect that arises from a perception of excess demand is proportional to the extent of offering price adjustment; and (3) all price adjustments result in overpriced or positive deviations from equilibrium prices. They are expected to reverse, eventually, if not soon.

A weaker form of the hypothesis is that the offering price needs not be less than its true equilibrium prices. That is, instead of riskless arbitrage by the sophisticated when they purchase IPOs at below equilibrium prices, they are willing to take some risks with the expectation that they can resale or flip at a profit. Here, the extent of first day underpricing, and long-term overpricing, is a function of the size of offer price adjustment, and not whether the initial offering price is below its equilibrium price.

To recapitulate how mispricing can occur in a market with many large and informed investors consider the following. First, underwriters generally underprice an IPO, for various reasons, such as risk aversion, or to bribe the informed to reveal their true demand (e.g., Tinic (1988) and Benveniste

and Spindt (1989)). This behavior is consistent with the following rank order of the underwriters' objectives: their own interests come first, then those of their long-time institutional investors, the infrequent issuers are next, and retail investors of other brokers rank last. Second, when underwriters of large IPO issues discover the aggregate demand from their book building activities, they have at least two strategic options.

First, for IPO issues in high demand, they can either stand pat, or raise the offering price. Second, for IPO issues found to be in low demand, they can choose to lower the offering price and/or shift their focus from the institutional to retail investors by increasing the marketing effort. Or, they can convince the institutional investors to participate, with an implicit promise that they can realize immediate profits from flipping. The participation of the institutional investors along with an increase in offering price could cause the uninformed retail investors to infer a condition of scarcity from high demand by the informed.

In either situation, increasing offering price will benefit the first three groups at the expense of the retail investors. Issuers receive higher cash proceeds from IPOs, institutional investors can realize quick profits from flipping, and the lead underwriters keep their main constituencies happy, with expectations of more future dealings. However, for a strategy of creating higher perceived demand to work, causing short term over pricing, and thus, profitability in flipping, the underwriters would have to pursue a mixed offering strategy in which the market observes instances of low demand issues experiencing offer price decreases, and observes no change in offering prices for high demand issues. As a consequence of the mixed strategy, the retail investors may be rendered less able to discern an issue's true demand when offer price is increased.

D. A Formal Model

In this section, we formally model the two hypotheses discussed above. Consider a multi-period model. Time 0 is the issuance date (where time –1, is the pre-offer date); Time 1 is a short period after IPO, it could be as short as a day, or minutes after offer; and Time 2 is a longer period horizon, such as one, two, or three years later.

Let there be two types of investors. Type L investors manage large portfolios, are sophisticated, capable of spending for information and analysis if needed, and have long term trading and other relationships with the underwriters. Type S investors are small, may not have the sophistication, analytical skills, funds to acquire information, and do not generate large trading commissions for the underwriters.

The objectives of both types of investors are identical: maximize expected returns from investing. To complete the analysis, we include first, the issuers whose objectives are, in order: (1) issue success, or raise the money through the IPO, and realize whatever benefits from going public; (2) maximize funds raised per one percent equity sold to outsiders, i.e., minimize dilution to insiders as the dual problem to (1) under constraints; and (3) raise the chance of success in issuing future securities. Secondly, we include the underwriters whose objectives are, in order: (1) to maximize their own profit from the current issue, i.e., ensuring issue success to collect underwriting fees and credit to gain future issues; (2) to benefit frequent clients, Type L; (3) to benefit the infrequent client, the issuer; and last, and least, (4) to benefit the retail investors, Type S, who may not even be the underwriter's direct clients, as they may be low transaction dollar clients from the designated selling group.

At Time –1, the underwriter, working with the issuer, makes a tentative pre-offer price, V(-1), or price range. Between Time –1 to offer date Time 0, the underwriters collect information on the demand schedule, i.e., aggregate shares demanded by L at prices in the neighborhood of V(-1), and decide the offer price, V(0). The information is useful but noisy.

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As a basis for later comparison, we start with a simple IPO allocation model in which only L type are allocated the IPO shares. Thus, the demand schedules the underwriter obtains is that of the L type. Depending on the expected demand, the underwriter may raise, hold, or lower the pre-offer price. Given that the underwriter deals only with L type, there are two considerations in pricing. First, since only L type receive all initial allocation, the offer price must be set less than or at most equal to its equilibrium price at Time 2 as expected by Type L, V(2,L):

$$V(0) \leq V\ (2, L). \tag{1}$$

Second, to induce the L types to reveal their true demand, the offer price may have to be set less than V(2,L), as in Benveniste and Spindt (1989):

$$V(0) < V(2, L). \tag{2}$$

Note that since only L type can receive allocation, either (1) or (2) must hold, strictly or else, no shares can be sold. If (1) or (2) is not satisfied, V(0) may either be decreased to satisfy (1) or (2), or the issue can be withdrawn.

To model the practice of short-term profit taking or flipping**,** we allow L type to sell shares in Time 1 (recall time 1 is as short as the first day, or the first few minutes). Next, we relax the assumption that only L type can subscribe. Instead of receiving 100% of shares, L type will receive the majority of shares at the offer, say from 60 to 80%, which is more realistic. The rest is to be allocated to S type to be based on the retail-selling brokers' allocation rule.

Recall L type investors are capable of spending money to gather information and to perform analysis on the issue. Specifically, let c be the expected information costs for each L type investor. Then a risk neutral L type will invest only if its expected value at time 2 exceeds its purchase price at the offer, and the information acquisition costs.

$$A_i V(0) + c < A_i V(2, L_i), \tag{3}$$

where A_i, is the number of shares allocated to Type L investor i. The product A_i x V(0) is the dollar allocation to investor i. Thus, Type L will either demand, or not take up its allocation, of an offer price satisfying Equation (3). Equation (3) may be rearranged as,

$$V'(0) < V(2, L_i) - \left(\frac{c}{A_i}\right), \tag{4}$$

V'(0) is the highest offer price above type L will pay for IPO shares, taking into account of information costs. Alternatively, it will not invest in information acquisition unless it gets a dollar allocation at least equal to A_i V(0) in (3) , or A_i to exceed.

$$A_i > \frac{c}{V(2,L_i) - V(0)}. \tag{5}$$

The importance of A_iV(0) is that it establishes a minimum threshold of dollar allocation Type L must have, before it will spend money to acquire information. Conversely, if they do not acquire information, they will also not purchase shares. Hence, there is the case of the IPO being too small

for type L, i.e., below A_i or $A_iV(0)$. For convenience, we shall call issues with size below this threshold small IPOs, and those above the threshold as large IPOs.

Now consider Type S, if they were to acquire the same information and to perform the same analysis as those of Type L, they would have to incur a higher cost, C > c, than L, as they are less efficient and capable. Since each Type S is expected to receive a much smaller allocation, $a_j << A_i$, and with higher costs to be informed, C > c, they would have to be able to subscribe at a much lower offer price than that paid by L type, as determined in Equation (4) above, which is clearly not possible, or, in accord with most practice.

Thus, Type S may: (a) not invest; (b) invest only indirectly, such as organizing many small Ss, into a Type L, as in a mutual fund; or c) do not follow L in information acquisition, but rather use less expensive but also less reliable sources of information. This information may be classified to come from two sources, both may be assigned a marginal cost of zero for the present analysis, C=0. The first is from unreliable third parties, with and without agency conflicts, such as brokers, heard on market rumors, internet chat room discussions, etc., The second are certain indicator variables in which the S type use to infer L type's demand for the shares. We shall designate these two sources of information as noise/rumors and indicator/signal. Here, S type may be regarded as feedback traders, whose trades depend on their inference concerning the trades taken by Type L. One such indicator is the change in pre-offer price to final offer price, in which they may infer an increase to signify high and unsatisfied demand by L type, and vice versa for price decreases. Another indicator is the percent of allocation 'take-up' by the L type.

Next, we solve for the strategies to be chosen by the underwriter and Type L investors. We shall limit our attention to the more interesting case of lower than expected demand.

The set of strategies available to the underwriters are: {lower offer price, hold, increase offer price, increase marketing effort}, Type S's form their conjecture concerning type L's demand based on both noise and indicators, while Type L forms expectations of type Ss' conjectures. Also, recall that there are two market segments for the IPOs: the large IPO market where both Type L and Type S participate, and the small IPO market where only some Type S participate.

To highlight the dominant strategy for each market segment, we start first with the simple case of only one large issue to be underwritten by the investment bank. Type L is now allowed to trade in Time 1, i.e., flipping. Let us examine each of the underwriter's strategies, and their resulting effects on L's and S's demand for shares, offering price, etc.

Reduce offer price. Type L would normally subscribe new shares as long as the price is lowered enough to cause Equation (3) to be satisfied. However, Type S would use the lowering of the offer price as an indicator of weak demand and may cause the post offer price to be even lower. Type L realizing that they could suffer a loss at time 1, may decide not to take up their allocations. Thus, allowing small investors to make conjectures about an offer's demand based on indicators may cause some underpriced IPOs not to be subscribed by the large investors, and fail. However, the story is far from over. A reduction in the shares taken up by the L type may cause Type S investors to conjecture why the L type under-subscribed their normal allocations. Each S type may not know L type's total demand, but they know L's take up from the ease the underwriters can fill the S type's own request for allocation. This is the situation described by Rock (1986) in his model. Thus, there is a positive probability that L type may again face post offer losses.

Hold offer price. Although this strategy is informationally neutral to the S type at first glance, the L type will not subscribe their allocations, as the offer price violates Equation (3), i.e., they would not rationally overpay. Thus, we find that, by introducing type S's conjecture to depend on indicators, both price decrease and no change may not be equilibrium strategies anymore, as they are to be avoided by the L type.

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Increase offer price. Here, independent of type L's own demand or valuation based on research and issuer's fundamentals, as long as L type is aware of how S type investors make their conjectures, they know an offer price increase will cause the type S to infer high demand, even if initial expected demand was weak. To show that this is an equilibrium solution, we need to show that L type will take up their subscriptions, and the underwriter would choose to increase the offer price.

For the first part, if Type L is allowed to trade at Time 1, their optimizing condition is no longer Equation (3), which is based on fundamental value, but on a looser condition:

$$E\left[V\left(1, \frac{L}{S}\right)\right] > V(0, +). \qquad (6)$$

E[V(1, L/S)] is the L's expectation of S's conjecture, that is a function of V(0, +), an offer price increase (+) at time 0. Equation (6) defines the condition and profit from flipping to L. Note that depending on E[V(…)], the long term rationality condition (3) need not be satisfied. In other words, with flipping, only short-term rationality condition (6) needs to be satisfied. Thus, there are situations, i.e., if (6) is satisfied, that L type will take up their allocations. Now, if the underwriter sees that L type will subscribe, in spite of apparent overpricing and low demand, they certainly would want to follow this strategy of raising the offer price. It makes sense in comparison to the other two strategies, as the underwriter can expect lower underwriting risks, and to please their issuer clients as well. Thus, an increase in offer price, under the condition that type S investors use indicators for L's aggregate demand, could be the dominant strategy.

Now for the small IPO market, the underwriter needs only be concerned with the conjectures made by the S type. Recall that S type investors form their conjecture about an issue's demand based on both noise and indicators. For small IPOs, given that L type investors do not participate, S type would have to rely more on noise/rumors. Since underwriters can, under the rubric of marketing expense – to send out noise and rumors as allegedly favorable information, they would see such expenses as the dominant strategy. Other strategy such as price decrease could cause S type to conjecture that the underwriter is revealing a low excess demand situation. Thus, the after-offer market of a price decrease is expected to be low (versus a prediction of larger price increase in the after-offer market for heavily marketed shares.)

Next, we shall relax the assumption that underwriters will underwrite only one large IPO issue. Allowing underwriters to underwrite several issues means both types of investors may examine the track record of each underwriter, i.e., there is a reputation effect. It stands to reason that an underwriter that consistently pursues an over pricing strategy (price increase in large IPOs, and marketing in small IPOs) may allow even the unsophisticated opportunity for learning over time, and cause them to exit the market, i.e., given enough time they will eventually find out that only overpriced shares are sold. However, S type, by definition, are not sophisticated, and learn slowly. Some S type may exit the market and new ones may enter, i.e., the "There is a new sucker born every minute syndrome. Furthermore, some S type do make money some of the time, as flippers on small IPOs, and on hard to price and consequently, underpriced shares in large IPOs. Thus, the dominant strategy outlined above need not be discarded even in a multi-period reputational world. With the above characteristics for S type, what is needed is to introduce some noise to defeat the slow learning by the S type in both markets. In other words, the optimal strategy need only be modified from a simple fixed strategy of {increase offer price} in large IPOs, and {increase marketing effort} in small IPO market, to a mixed strategy of {increase, hold, decrease offer price}, and {increase marketing, hold, decrease offer price}, i.e., mixing the use of these strategies from case to case. The mixing of strategies would present to the S type, who has limited capacity to learn in the first place, a large array of previous observations or

experiences. These are: under demanded issues that were reduced in price in which they have done well, under demanded issues that were increased in price, under demanded issues that have no change in offer price but with more intense marketing pressures, resulting in large first day price gains, over demanded issues that were increased in offer price, etc. These predictions are consistent with empirical results of observing all these cases in instances of weak perceived demand.

III. Sample Selection and Characteristics

We gather our initial sample from Thomson Reuters SDC New Issues database to empirically test the Impresario and Push hypotheses described and modeled in Sections 2.2 through 2.4. Specifically, we compile a sample of firmly underwritten IPOs completed between 1981 and 2017, which we split into pre- and post-bubble periods (1981-1996, 1997-2017). We apply sample filters consistent with the IPO literature, excluding blank check offerings, closed end funds, unit offers, offers priced below $5, and dual class firms. In addition, we require nonmissing values for the reallowance fee, selling concession, initial price range, and offer proceeds, as well as the initial and one-year post-IPO returns (obtained from CRSP), which we describe below.

Tables 1 and 2 report the descriptive statistics and performance measures for the pre and post IPO bubble samples when divided into five portfolios based upon offer size to control for economies of scale in underwriter fees. As such, from this point forward in this analysis, size quintile portfolios are employed when conducting univariate tests. The second column of Tables 1 and 2 report the initial returns for the portfolios. The average initial return is defined as:

$$IR_q = \frac{\sum_{i=1}^{n} \log\left(\frac{P_i}{P_{i0}}\right)}{n_a}, \tag{7}$$

where IR_q is the average mispricing of portfolio q, P_i is the closing price (or the mean of the bid and ask price for NASDAQ stocks) for firm i on the first day of trading, P_{i0} is the offering price of firm i, and n is the number of firms in portfolio q.

The average initial return for each of the quintiles is generally consistent with the previous literature, which finds that smaller IPOs have greater mispricing (e.g., Ibbotson and Ritter (1995)). Although this initial mispricing varies from over 33% for the smallest quintile to approximately 6% for the other quintiles, all five of the portfolio initial returns are significantly different from zero beyond all conventional levels of significance. Note that the final column reports that the sizes of these IPOs differ quite significantly. The smallest quintile averages $5.11 million whereas the largest quintile averages nearly $109 million. Columns three and four of Tables 1 and 2 report the one and three-year holding period abnormal returns for each quintile. This long-run abnormal return (AR_{iT}) for firm i for T months (i.e., 12 or 36 months) is defined as:

$$AR_{iT} = \prod_{t=1}^{T}\left(1 + R_{i,t}\right) - \prod_{t=1}^{T}\left(1 + R_{b,t}\right) \tag{8}$$

for t = 1, 2, ..., T where T is the series of months in the holding period, $R_{i,t}$ is the return for stock i in month t, and $R_{b,t}$ is the return of the corresponding size and book-to-market equity reference portfolio formed at the beginning of the IPO month. Similar to Lyon, Barber, and Tsai (1999), reference portfolios are constructed from the intersection of (i) 14 size (i.e., book value of equity) groups formed from NYSE decile breakpoints with the smallest decile group split further into quintiles deciles, and (ii) book-to-market equity quintiles.

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Table 1 reveals that the smallest quintile has the greatest negative one year (mean = -5.75%, p = 0.0674) and three year (mean = -16.25%, p = 0.0086) long-run performance, consistent with Brav and Gompers (1997). Further analysis of the long-run returns is deferred to later sections when portfolios are formed based upon selling effort and price adjustments. Tables 1 and 2 also reveal economies of scale in all three measures of selling effort. This result is an extension of the Lee, et al. (1996) finding for IPO gross spreads.

The next to final column of Tables 1 and 2 report the pre-offer price adjustments for the IPOs. We measure the price adjustment as:

$$Price\ Adjustment = \frac{(Offer\ Price - Expected\ Price)}{Expected\ Price} \qquad (9)$$

where Offer Price is the actual offer price per share at the effective date and Expected Price is the average of the Initial High File Price and Initial Low File Price. The results in Tables 1 and 2 indicate that pre-offer price adjustments seem to be dependent on the size of the offer. That is, the smaller issues tend to decrease their offer price, whereas larger issues tend to increase their offer price. This finding is new and extends the work of Hanley (1993), Dunbar (1998), and Chang, Chiang, Qian, and Ritter, (2017).

An average increase in the offer price for large issues is consistent with the impresario hypothesis of Shiller (1990). Shiller argues that IPOs are purposely underpriced by investment banks to create the appearance of an excess demand. The rest of the predictions for this hypothesis are to be presented below.

IV. IPO Selling Efforts

It has been argued that the selling efforts of underwriters can significantly impact the success of an IPO. For example, when Ritter (1998) addresses the question of why issuers allow considerable money to be left on the table due to underpricing, he concludes, "... the investment banker will always be willing to argue that the price jump was due to a successful job of marketing the issue by the investment banker."

To empirically analyze whether this type of argument is valid, we form three additional portfolios within each size quintile. These portfolios are based upon the reallowance fee paid by the issuer to float the IPO. Table 3 reports the results of the fifteen portfolios. The first item of concern deals with the relationship between the selling effort and the initial return for each portfolio.

Ritter's assertion above seems plausible for the smallest two quintiles. The quintiles represent the smaller issues that are dominated by individual investors. It is hypothesized that these investors are the ones to be most persuaded by brokers and dealers as they attempt to push the issue into the marketplace. This type of selling effort can be thought of as the unsolicited phone calls from brokers who provide a "hot tip" on a new IPO. By definition, this type of selling strategy works less (if at all) on sophisticated investors. Table 3 provides empirical support for the Push hypothesis. The results indicate that the higher reallowance portfolios within quintiles 1 and 2 (i.e., smallest issues) experience the highest initial first day return (43.8% and 10.1% respectively).

If the clientele effect is significant, we expect the larger issues not to display a positive relationship between the IPO initial return and the level of reallowance. The largest two quintiles indicate that there is actually a *negative* relationship between the degree of underpricing and the level of reallowance. In the larger issues, a relatively large reallowance is indicative of a shift in marketing strategy from institutional to retail investors. It follows that those large issues that have a high

reallowance (i.e., those that must shift more heavily into the retail market) are those with weaker demands. Thus, the monotonic decrease of initial returns for Quintiles 4 and 5 may be due to this shifting in clientele.

Another implication of an effective selling effort to retail investors is that along with the high initial returns, the associated small IPOs will experience poor long-run returns. Quintile one reveals that those IPOs that are pushed into the marketplace with a high reallowance effort perform almost three times below the medium reallowance portfolio and over 10 times below the low reallowance group. This finding indicates that brokers and sellers realize which issues are not as strong and as such, choose to increase selling effort on these IPOs. The aggregate effect is a temporary surge in demand as evidenced by the strong initial mispricing, followed by poor long-run performance.

Consistent with the prediction in Shiller's Impresario hypothesis, the largest issues also display the pattern that the firms with the greatest underpricing perform the worst in the long run. If investment bankers do indeed file the initial price low in an attempt to create a strong demand schedule, then it follows that these same firms may increase the offer price prior to the effective date in order to benefit further from this hyped-demand. The final column of Table 3 confirms this assertion. The largest firms in Quintile 5 display a positive relationship between the initial return of the IPO and the ex-ante effective date price adjustment, and subsequent large offsetting losses. These findings provide empirical support for Shiller's impresario hypothesis.

V. IPO Offer Price Changes as a Marketing Technique

Hanley (1993) documents that the adjustment of offer prices prior to the effective date does impact the initial returns of IPOs. Dunbar (1998) builds on the study of Hanley and documents that under certain conditions, the price adjustments also impact the long-run performance of IPOs. To further investigate the role of price adjustments on the initial and long-run performance of IPOs, in this section we create fifteen portfolios based upon size and ex ante price adjustment.

Table 4 reports the market performance for these fifteen portfolios. The Impresario hypothesis predicts that large issues that increase the offer price will experience the greatest underpricing. The largest two quintiles arguably contain greater sophisticated money than the smaller two quintiles. The initial return patterns in the largest two quintiles support the Impresario explanation. In both quintiles, the greater the level of price adjustment, the greater the degree of underpricing. Consistent with P2, this positive relationship is not as clear in Quintile 2 (very few institutional investors) and is not present in Quintile 1 (virtually no institutional investors).

Considering the long-run performance of the various portfolios also reveals some new evidence of the relationship between ex ante price adjustment, initial returns, and long-run returns. Consistent with our predictions**,** Table 4 reports that for the largest quintile (i.e., the one with a dominance of institutional investors) the high price adjustment firms experience negative three-year performance. Also consistent with our theory, the low-price adjustment firms experience no underpricing and positive three-year abnormal returns (i.e., initial return = 0.49%, 1-year return = 8.10%, and 3-year return = 12.85*%).*

These results parallel those of the smallest quintile for the reallowance effects and suggest that investment bankers use different strategies to the same end depending on the clientele they are servicing. Specifically, for the smallest quintile, investment bankers rely on greater broker/dealer selling effort which results in greater initial returns and worse long-run performance. For the largest quintiles, investment bankers rely on price changes which achieve the same end (i.e., creating a large

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demand, as evidenced by the high initial jump, for inferior IPOs, as evidenced by the poor long-run performance).

Finally, the last column of Table 4 also suggests an inverse relationship between price adjustment and reallowance. That is, investment bankers tend to lower the price and increase the retail selling effort simultaneously. In the next section, we further analyze the impact of selling effort and price adjustments.

VI. Multivariate Empirical Tests of Initial and Long-run Returns

The previous sections all discuss univariate analyses of the data. In this section, regression models are estimated in order to analyze the empirical predictions in a multivariate setting. Two subsamples are employed in these tests — a portfolio consisting of the smallest quintile and a portfolio consisting of the two largest quintiles. The regression models are estimated in four separate iterations, two for initial returns and two for the three-year horizon returns.

A. Pre-IPO Bubble Initial Return OLS Models

The first model estimated for each portfolio is:

$$Initial\ Return = \alpha + \beta_1 Gross\ Proceeds + \beta_2 Reallowance\ Fee + \beta_3 Offer\ Price\ Change + \beta_4 Venture\ Capital\ Dummy + \beta_5 Underwriter\ Reputation + \varepsilon \quad (10)$$

where:
Initial Return is as defined in Equation (7), Gross Proceeds is the gross proceeds raised in the IPO, Reallowance Fee is the ratio of reallowance to selling commission, Offer Price change is as defined in Equation (9), Venture Capital Dummy equals one when the IPO is venture capital backed and zero otherwise (Chemmanur, Loutskina, and Tian, 2014.), and Underwriter Reputation is the dollar volume of IPOs the lead investment bank managed during the sample period (Bajo, Chemmanur, Simonyan, and Tehranian, 2016).

Table 5 reports the results of the model in Equation (10) for the smallest quintile portfolio. The first column contains the independent variable and the second column contains the predicted sign of the estimated coefficient. Gross proceeds is a control variable designed to remove size effects from the variables of interest. For the smallest issues, it is predicted to have a negative coefficient based on an information asymmetry argument (Boone, Floros, and Johnson, 2016.). Specifically, the smaller issues are less transparent (and as such inherently riskier) resulting in greater underpricing. Table 5 provides evidence for this prediction with a negative coefficient that is significantly different than zero.

The final column of Table 5 reports the estimated elasticity for the gross proceeds variable from the first model. This measure is constructed by multiplying the estimated coefficient of gross proceeds by the ratio of the mean of gross proceeds and the mean of the initial return. In general:

$$Elasticity\ of\ X\ on\ Y = \frac{\partial Y}{\partial X} * \frac{Mean\ of\ X}{Mean\ of\ Y} \quad (11)$$

where the first ratio represents the partial derivative of Y based upon a change in X. The interpretation for this measure is that for each one percentage change in X, Y changes by the elasticity measure. In the case of gross proceeds, for every one percentage increase in the gross proceeds, the initial return is decreased 1.35 percent.

The reallowance fee is predicted to be positively related to the degree of underpricing based upon the argument that in general the extra selling effort creates a strong initial demand for the IPO. The estimated coefficient for reallowance is positively significant ($p = 0.0041$) and the elasticity is 0.68. This indicates that the selling effort of brokers and dealers is significant in increasing the initial returns of IPOs for small issues (consistent with P3).

Based upon the marketing arguments discussed earlier in this paper, small issues are predicted not to be significantly affected by offer price changes (as they generally are not known by the small issue clientele). Table 5 reports that the coefficient on the offer price change variable is negative and not significantly different than zero. This finding is consistent with the marketing argument.

As a control variable, a venture-backed dummy is included to capture any venture capital effects. It is predicted that IPOs that are backed by venture capital will have a lower degree of underpricing due to the certification role of venture capitalists (Megginson and Weiss (1991)). Contrary to this prediction, the coefficient is positive and significantly different than zero.

The final term in the first model is a proxy for the underwriter reputation of the lead (i.e., book) investment bank. This variable is predicted to be negative based upon the certification role of prestigious underwriters (Booth and Smith (1986), Chemmanur and Fulghieri (1994) and Dunbar (1999)). The estimated coefficient for underwriter reputation is consistent with this prediction; however, it is not significantly different from zero.

Table 6 reports the results of the model in Equation (10) for the largest two quintile portfolios. Gross proceeds is predicted to be negatively related with the degree of underpricing based upon the notion that larger issues are associated more with a sophisticated clientele. Because this clientele has acquired costly information pertaining to the value of the IPO, the asymmetric information problem is reduced and it is predicted that the larger issues will be less severely underpriced. Table 6 provides evidence consistent with this prediction with a negative estimated coefficient, however it is not significantly different from zero.

In larger issues, a high reallowance fee is indicative of a shift from institutional to retail investors. It follows that investment banks initiate this shift when the estimated demand schedule for the IPO is weak. As such, we predict that the reallowance fee will have a negative coefficient in these larger issue regressions (i.e., the opposite prediction than for the small issues). Consistent with this logic, Table 6 reports that the coefficient for the reallowance variable is negative and significant beyond all conventional levels of significance. Additionally, the effect is notable based upon the elasticity measure of -1.76.

The coefficient on the offer price change variable is significantly different from zero beyond the one percent level as predicted by the argument that increasing the ex-ante offer price increases demand. As such, this strong demand drives the first day price high, exhibited by larger underpricing. It is notable that this finding is consistent with the clientele argument of marketing. Recall that this variable is not significant in the small quintile regressions, yet it is highly significant for the larger issues.

The final two control variables, venture backed and underwriter reputation are predicted to be negatively related with the first day initial returns. As in the small quintile, the venture backed issues tend to have greater initial first-day returns and underwriter reputation has a negative coefficient.

Overall, the initial return regressions indicate that marketing effort does matter in the underpricing of IPOs. Specifically, reallowance fees are directly associated with initial returns in small issues and indirectly related to initial returns in large issues. Additionally, offer price adjustments are directly related with initial returns for large issues and not significantly correlated with initial returns for small issues.

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B. Three-year Horizon OLS Models

The results from the long-run OLS tests are reported in Tables 7 and 8. For the small issues, the reallowance variable is predicted to be negatively related with long-run performance based upon the idea that IPOs that must be pushed into the market are inferior on average. Table 7 confirms the negative correlation; however, the coefficient is not significantly different than zero. Although not statistically significant, the reallowance fee has an elasticity of nearly -4.

For the small issues, the offer price change variable is predicted not to impact the long-run returns. The coefficient is positive and non-significant. The predictions for each of the control variables are the same for Tables 7 and 8. The coefficient on gross proceeds is unclear. Relying on the small firm effect, it is predicted to be negative. Specifically, small firms tend to outperform large firms on average (e.g., Fama and French (1992)). Based upon the findings of Brav and Gompers (1997) it is predicted to be positive. Finally, if the partition by size into portfolios has removed the majority of size effects, it is predicted to be non-significant.

The venture-backed dummy is designed to capture the effect of venture capital influence on the IPO. Megginson and Weiss (1991) and Brav and Gompers (1997) show that IPOs that are backed by venture capital outperform those IPOs that are not. Due to this certification process, we predict that the venture-backed dummy coefficient has a positive relationship with the long-run returns.

The final variable in the regressions is a proxy for the underwriter reputation of the lead underwriter. Carter, Dark and Singh (1998) show that issues underwritten by prestigious underwriters perform better than those that are not. It follows that this certification process of prestigious underwriters will be demonstrated by a positive coefficient on the underwriter reputation variable.

Table 7 reports that for the smallest quintile none of the control variables are significant; however, by including them in the regression their confounding effects are removed from the two variables of interest.

Table 8 reports the results for the largest two quintiles. The variable of greatest interest in this regression is offer price change. It is predicted to be negatively related with the long-run return based upon the marketing strategy presented earlier in this paper. That is, investment bankers are able to sell inferior issues at greater prices by purposely setting the offer price low and then increasing it once the demand is great. Over the long-term, these issues are predicted to underperform with the retail investors bearing the losses. Consistent with this logic, the coefficient on the offer price change variable is negative and significant beyond the one percent level.

Taken together, the three-year horizon regressions provide evidence that the selling effort as measured by the reallowance fee impacts the long-run performance of small IPOs and the price change impacts the long-run performance of large IPOs. Specifically, the high reallowance fee elasticity indicates that long-run small issue performance is especially sensitive to changes in the selling effort. Also consistent with earlier arguments, ex ante price adjustments are shown to significantly impact the long-run performance of large IPOs.

C. Post-IPO Bubble Sample (1997-2017)

The post-IPO bubble reveals interesting results and document the shifts in the selling of IPOs. Tables 9 and 10 evaluate the empirical performance of the theoretical model from 1997 to 2017. We find empirical evidence suggesting that the push hypothesis is not supported during this latter time period, however we find empirical support for the impresario hypothesis. In Table 9, we document that the quantitative results found in the pre-IPO bubble are not robust to new investor behavior and the push hypothesis in our model no longer appears to be supported in the sample tested. However, in Table 10 we document that the impresario hypothesis still appears as a relevant factor. Multivariate analysis (not tabulated but available upon request) provide qualitatively similar findings.

One explanation is the reduced importance of retail investors in IPO allocations in recent years. Although deal-level allocation data is not available on a widespread basis, the typical allocation to institutions has increased over time from roughly 66% in the mid-1980s (Hanley and Wilhelm, 1995) to upward of 90% more recently.[1] In addition, Robinhood's IPO in 2021 was deemed unusual for planning a retail allocation of shares of up to 35%.[2] Increasing institutional allocations suggest that retail (i.e., non-sophisticated) investors play a smaller role in the current IPO market for primary shares, explaining why pushing shares to retail investors might cease to be a widespread strategy. In contrast, we find continued evidence for the Impresario Hypothesis in more recent years, which involves initial allocations to institutions and other sophisticated investors, consistent with recent allocation trends. The evidence we provide suggesting a shift in IPO selling strategies in recent years may be a rich field for further research.

Furthermore, recent developments indicate that IPO selling strategies might be shifting yet again. For example, retail brokerages such as Robinhood and SoFi have recently introduced mechanisms to allocate IPO shares to small retail investors.[3] Whereas early allocations have been small (< 3% of shares offered), these new programs offer a potentially new channel to provide/push IPO shares to non-sophisticated investors.

VII. Summary and Conclusion

The purpose of this paper is to demonstrate the importance of the marketing effort of IPOs. As such, we have examined the reallowance fee that is used to remunerate brokers and dealers for their selling efforts as well as ex ante offer price adjustments. The results indicate that investment banks use both of these mechanisms successfully; however, their use depends upon the investment clientele.

Before the IPO bubble, retail investors, especially those who invest in very small IPOs, seem to respond to the selling efforts of brokers and dealers. The empirical results indicate that IPOs that must be pushed into the market (to these retail investors) have a greater initial return than those that are not pushed. It is argued that this greater initial return is the result of an increased demand created by an intense selling effort. These same IPOs that experience a large initial surge also perform the worst over the long-term (i.e., one- and three-year horizons). Thus, dealers and sellers are able to create a demand for inferior IPOs through their selling efforts to retail clients as evidenced by these empirical findings.

Institutional investors on the other hand do not respond as strongly to the selling efforts of dealers and brokers. By manipulating the pre-offer price, investment bankers are able to increase the demand for IPOs. Specifically, investment bankers tend to systematically underprice large IPOs in the initial prospectus and then subsequently adjust the price upward. This subsequent increase in the offer price sends a positive signal to the market and as such creates an even greater demand for the IPO. These large issues that increase the pre-offer price subsequently perform worse than large issues that do not increase the ex-ante offer price. Following the IPO bubble, the Impresario Hypothesis is empirically supported, indicating a shift in selling mechanisms post-bubble.

[1] https://www.fidelity.com/learning-center/trading-investing/trading/ipo-share-allocation-process.
[2] https://www.ft.com/content/ee755c02-dd09-4041-8b14-efad30a662a6.
[3] See https://robinhood.com/us/en/support/articles/ipo-access/ and https://www.sofi.com/invest/ipo-investing/.

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Table 1
Panel A: Pre-IPO Bubble Descriptive Statistics for Quintile Size Groups

Descriptive statistics for 3,403 firmly underwritten IPOs that occurred between 1981 and 1996. The initial return is calculated as the natural logarithm of the ratio of the closing first day price to the offer price. One and three-year Abn. Rtn. are the abnormal returns over one and three years defined as the holding period return of the IPO adjusted by the return on a matching benchmark firm based on size and market to book ratio. Reallowance fee (Selling concession)/Gross proceeds is the percentage proportion of the reallowance (selling concession) to the gross proceeds. The reallowance/selling concession is the portion of the reallowance fee within the selling concession. Price adjustment is the percentage change between the initial filing expected offer price and the final offer price. Gross proceeds is the amount of dollars in millions raised by the IPO.

Size Quintile	Initial Return	1 Year Abn. Rtn.	3 Year Abn. Rtn.	Reallowance to Proceeds	Concession to Proceeds	Reallowance to Concession	Price Adjustment	Gross Proceeds
Q1 (Smallest)	33.80%	-5.75%	-16.25%	2.04%	4.80%	42.06%	-4.47%	$5.11 Mil
P-value	0.0001	0.0674	0.0086	0.0001	0.0001	0.0001	0.0001	0.0001
Sample Size	681	681	438	681	681	681	680	681
Median	22.00%	-11.18%	-29.25%	1.91%	4.75%	40.00%	0.00%	$5.20 Mil
Q2	5.89%	-0.22%	24.77%	1.34%	4.11%	32.70%	-9.45%	$12.68 Mil
P-value	0.0001	0.9413	0.0037	0.0001	0.0001	0.0001	0.001	0.0001
Sample Size	680	680	453	679	679	679	680	680
Median	3.51%	-4.38%	9.19%	1.25%	4.00%	30.30%	-8.33%	$12.80 Mil
Q3	5.84%	1.25%	17.57%	1.02%	3.99%	25.62%	-3.41%	$22.09 Mil
P-value	0.0001	0.695	0.0331	0.0001	0.0001	0.0001	0.0001	0.0001
Sample Size	680	680	471	680	680	680	680	680
Median	4.75%	-4.43%	-7.34%	0.97%	4.00%	23.81%	0.00%	$22.00 Mil
Q4	9.64%	6.62%	11.94%	0.84%	4.01%	20.94%	5.54%	$36.18 Mil
P-value	0.0001	0.0417	0.0963	0.0001	0.0001	0.0001	0.0001	0.0001
Sample Size	682	682	457	682	682	682	682	682
Median	9.18%	0.63%	-15.15%	0.77%	4.00%	19.23%	4.54%	$35.5 Mil
Q5 (Largest)	6.41%	2.41%	0.17%	0.66%	3.78%	17.74%	4.33%	$108.96 Mil
P-value	0.0001	0.3023	0.9761	0.0001	0.0001	0.0001	0.0001	0.0001
Sample Size	680	680	506	680	680	680	680	680
Median	4.99%	1.26%	-0.49%	0.61%	3.9%	15.9%	3.45%	$78.00 Mil

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Table 2
Panel B: Post-IPO Bubble Descriptive Statistics for Quintile Size Groups

Descriptive statistics for 2,006 firmly underwritten IPOs that occurred between 1997 and 2017. The initial return is the percentage change from the offer price to the first-day closing price. One and three-year Abn. Rtn. are the abnormal returns over one and three years defined as the holding period return of the IPO adjusted by the return on a matching benchmark firm based on market capitalization (size) and book-to-market equity ratio. Reallowance fee (Selling concession)/Gross proceeds is the percentage proportion of the reallowance (selling concession) to the gross proceeds. The reallowance/selling concession is the portion of the reallowance fee within the selling concession. Price adjustment is the percentage change between the initial filing expected offer price and the final offer price. Gross proceeds is the amount – in millions of 2020 dollars – raised by the IPO, adjusted for inflation using the quarterly GDP deflator.

Size Quintile	Initial Return	1 Year Abn. Rtn.	3 Year Abn. Rtn.	Reallowance to Proceeds	Concession to Proceeds	Reallowance to Concession	Price Adjustment	Gross Proceeds
Q1 (Smallest)	10.46%	-7.89%	-14.88%	1.20%	4.03%	30.11%	-13.47%	$31.77 Mil
P-value	0.0001	0.051	0.0701	0.0001	0.0001	0.0001	0.0001	0.0001
Sample Size	401	401	398	401	401	401	401	401
Median	3.13%	-26.03%	-56.64%	1.11%	4.00%	28.57%	-13.33%	$33.23 Mil
Q2	26.56%	-10.57%	-28.60%	0.92%	4.09%	22.57%	-2.86%	$60.48 Mil
P-value	0.0001	0.0214	0.0031	0.0001	0.0001	0.0001	0.0130	0.0001
Sample Size	401	401	398	401	401	401	401	401
Median	13.33%	-25.63%	-73.35%	0.83%	4.17%	21.28%	0.00%	$60.12 Mil
Q3	37.92%	-12.75%	-36.28%	0.77%	4.11%	18.83%	7.37%	$91.13 Mil
P-value	0.0001	0.0038	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Sample Size	402	402	397	402	402	402	402	402
Median	16.58%	-27.23%	-71.64%	0.71%	4.18%	18.18%	6.25%	$90.78 Mil
Q4	46.47%	-21.73%	-43.90%	0.67%	4.09%	16.60%	12.56%	$142.74 Mil
P-value	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Sample Size	401	401	399	401	401	401	401	401
Median	18.00%	-29.62%	-63.96%	0.67%	4.19%	15.87%	6.67%	$137.76 Mil
Q5 (Largest)	24.55%	-8.64%	-22.73%	0.60%	3.76%	16.11%	6.33%	$516.11 Mil
P-value	0.0001	0.0075	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Sample Size	401	401	401	401	401	401	401	401
Median	6.89%	-9.86%	-39.16%	0.56%	3.90%	14.93%	0.00%	$307.20 Mil

Table 3
Reallowance to Selling Concession Quintile Size Groups Pre-Bubble

Portfolios of IPOs occurring between 1981 and 1996 based upon the reallowance fee. The reallowance/concession is the portion of the reallowance fee within the selling concession. The initial return is calculated as the natural logarithm of the ratio of the closing first day price to the offer price. One and three-year Abn. Rtn. are the abnormal returns over one and three years defined as the holding period return of the IPO adjusted by the return on a matching benchmark firm based on size and market to book ratio. Price adjustment is the percentage change between the initial filing expected offer price and the final offer price. [a], [b], and [c] indicate the value is statistically different from zero at the 0.01, 0.05, and 0.10 levels, respectively.

Sample	Sample Size	Initial Return	1 Year Abn. Rtn.	3 Year Abn. Rtn.	Price Adjustment
Panel A. Quintile 1 (Smallest)					
Low Reallowance/Concession	259	31.59%[a]	-7.37%	-3.28%	-4.12%
Medium Reallow/Concession	175	23.40%[a]	2.61%	-12.10%	-6.56%
High Reallowance/Concession	247	43.80%[a]	-9.99%	-33.29%[a]	-3.48%
Panel B. Quintile 2					
Low Reallowance/Concession	226	4.02%[c]	-3.87%	14.03%	-3.75%
Medium Reallow/Concession	224	4.75%[a]	3.96%	43.02%[b]	-11.47%
High Reallowance/Concession	229	10.12%[a]	-0.63%	16.90%	-13.13%
Panel C. Quintile 3					
Low Reallowance/Concession	218	5.78%[a]	6.75	32.32%[b]	4.87
Medium Reallow/Concession	234	8.51%[a]	-0.68	18.43%	-4.06
High Reallowance/Concession	228	3.15%[c]	-2.03	0.41%	-10.66
Panel D. Quintile 4					
Low Reallowance/Concession	229	16.58%[a]	10.20%[c]	13.36%	15.87%
Medium Reallow/Concession	221	11.00%[a]	-2.30%	2.75%	5.32%
High Reallowance/Concession	232	1.49%	11.57%[c]	20.29%	-4.44%
Panel E. Quintile 5 (Largest)					
Low Reallowance/Concession	209	10.11%[a]	-2.05%	-0.72%	11.37%
Medium Reallow/Concession	241	9.75%[a]	4.40%	-16.24%[c]	6.81%
High Reallowance/Concession	230	-0.45%	4.83%	17.25%[c]	-4.67%

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Table 4
Percentage Price Change Prior to Offer Quintile Size Groups Pre-Bubble

Portfolios of IPOs occurring between 1981 and 1996 based upon price adjustment. Price adjustment is the percentage change between the initial filing expected offer price and the final offer price. (Generally, low (high) price adjustments indicate offer price decreases (increases) and the medium price adjustment contains those issues with little or no change.) The initial return is calculated as the natural logarithm of the ratio of the closing first day price to the offer price. One and three-year Abn. Rtn, is the abnormal return over one and three years defined as the holding period return of the IPO adjusted by the return on a matching benchmark firm based on size and market to book ratio. The reallow/concess is the portion of the reallowance fee within the selling concession. [a], [b], and [c] indicate the value is statistically different from zero at the 0.01, 0.05, and 0.10 levels.

Sample	Sample Size	Initial Return	1 Year Abn. Rtn.	3 Year Abn. Rtn.	Reallow/ Concess
Panel A. Quintile 1 (Smallest)					
Low Price Adjustment	227	23.20%[a]	-8.56%[c]	-14.73%	40.31%
Medium Price Adjustment	365	45.57%[a]	-4.75%	-17.91%[b]	44.56%
High Price Adjustment	88	12.39%[b]	-4.18%	-17.11%	36.27%
Panel B. Quintile 2					
Low Price Adjustment	224	6.43%[a]	7.84%	26.37%[b]	34.88%
Medium Price Adjustment	201	4.14%[c]	-8.18%	20.21%	32.38%
High Price Adjustment	255	6.80%[a]	-1.02%	27.28%[b]	31.05%
Panel C. Quintile 3					
Low Price Adjustment	221	2.54%[b]	-5.27%	8.06%	28.97%
Medium Price Adjustment	233	5.94%[a]	-1.08%	4.02%	25.31%
High Price Adjustment	226	8.95%[a]	10.03%[c]	38.52%[b]	22.66%
Panel D. Quintile 4					
Low Price Adjustment	212	1.49%	7.48%	37.91%[b]	23.95%
Medium Price Adjustment	243	5.59%[a]	2.95%	6.44%	20.48%
High Price Adjustment	227	21.58%[a]	9.74%[c]	-2.09%	18.63%
Panel E. Quintile 5 (Largest)					
Low Price Adjustment	226	-0.49%	8.10%[b]	12.85%	20.22%
Medium Price Adjustment	227	5.84%[a]	6.99%[c]	7.14%	17.73%
High Price Adjustment	227	13.85%[a]	-7.83%[c]	-18.42%[c]	15.29%

Table 5
OLS Regressions with Initial Return as the Dependent Variable, Smallest Quintile Pre-Bubble

Ordinary Least Squares regression of the quintile of the smallest IPOs occurring between 1981 and 1996. The model estimated is:

Initial Return = $\alpha + \beta_1$Gross Proceeds + β_2Reallowance Fee + β_3Offer Price Change + β_4Venture Capital Dummy + β_5Underwriter Reputation + ε,

where: Initial Return is calculated as the natural logarithm of the ratio of the closing first day price to the offer price; Gross Proceeds is the gross proceeds raised in the IPO; Reallowance fee is the ratio of reallowance to selling commission; Offer price change is the percentage change between the initial filing expected offer price and the final offer price; Venture capital dummy equals one when the IPO is venture capital backed and zero otherwise; and Underwriter reputation is the dollar volume of IPOs the lead investment bank managed during the sample period. The elasticity is defined as the product of the estimated coefficient and the ratio of the independent variable mean to the dependent variable mean.

Independent Variable	Empirical Prediction	Parameter Estimate (p-value)	Elasticity
Intercept		0.3596 (0.0041)	
Gross proceeds	-	-0.0613 (0.0002)	-1.3503
Reallowance fee	+	0.0041 (0.0149)	0.6815
Offer price change	+	-0.0012 (0.5231)	0.0237
Venture backed	-	0.1154 (0.0233)	
Underwriter reputation	-	-1.750 (0.3501)	-0.0249
Sample Size		303	
R-square		0.1027	
F Value		6.82	

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Table 6
OLS Regressions with Initial Return as the Dependent Variable,
Two Largest Quintiles Pre-Bubble

Ordinary Least Squares regression of the two quintiles of the largest IPOs occurring between 1981 and 1996. The model estimated is:

Initial Return = $\alpha + \beta_1$Gross Proceeds + β_2Reallowance Fee + β_3Offer Price Change + β_4Venture Capital Dummy + β_5Underwriter Reputation + ε,

where: Initial Return is calculated as the natural logarithm of the ratio of the closing first day price to the offer price; Gross Proceeds is the gross proceeds raised in the IPO; Reallowance fee is the ratio of reallowance to selling commission; Offer price change is the percentage change between the initial filing expected offer price and the final offer price; Venture capital dummy equals one when the IPO is venture capital backed and zero otherwise; and Underwriter reputation is the dollar volume of IPOs the lead investment bank managed during the sample period. The elasticity is defined as the product of the estimated coefficient and the ratio of the independent variable mean to the dependent variable mean.

Independent Variable	Empirical Prediction	Parameter Estimate (p-value)	Elasticity
Intercept		0.1879 (0.0001)	
Gross proceeds	-	-0.0002 (0.1750)	-0.1958
Reallowance fee	-	-0.0058 (0.0001)	-1.7599
Offer price change	+	0.0025 (0.0001)	0.1777
Venture backed	-	0.0432 (0.0143)	
Underwriter reputation	-	-0.321 (0.1607)	-0.1994
Sample Size		1087	
R-square		0.0764	
F Value		17.892	

Table 7
OLS Regressions with Three Year Abnormal Returns as Dependent Variable, Smallest Quintile Pre-Bubble

Ordinary Least Squares regression of the quintile of smallest IPOs occurring between 1981 and 1996. The model estimated is:

Three Year Return = α + β_1Gross Proceeds + β_2Reallowance Fee + β_3Offer Price Change + β_4Venture Capital Dummy + β_5Underwriter Reputation + ε,

where: Three Year Return is the abnormal return over three years and is defined as the holding period return of the IPO adjusted by the return on a matching benchmark firm based on size and market to book ratio; Gross Proceeds is the gross proceeds raised in the IPO; Reallowance fee is the ratio of reallowance to selling commission; Offer price change is the percentage change between the initial filing expected offer price and the final offer price; Venture capital dummy equals one when the IPO is venture capital backed and zero otherwise; and Underwriter reputation is the dollar volume of IPOs the lead investment bank managed during the sample period. The elasticity is defined as the product of the estimated coefficient and the ratio of the independent variable mean to the dependent variable mean.

Independent Variable	Empirical Prediction	Parameter Estimate (p-value)	Elasticity
Intercept		0.6569 (0.2376)	
Gross proceeds		-0.0575 (0.4213)	-2.7609
Reallowance fee	-	-0.0111 (0.1154)	-3.9621
Offer price change		0.0058 (0.4614)	-0.2258
Venture backed	+	0.0477 (0.8246)	
Underwriter reputation	+	-3.482 (0.7278)	-0.0871
Sample Size		194	
R-square		0.0183	
F Value		0.704	

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Table 8
OLS Regressions with Three Year Abnormal Returns as Dependent Variable, Two Largest Quintiles Pre-Bubble

Ordinary Least Squares regression of the two largest quintiles of IPOs occurring between 1981 and 1996. The model estimated is:

Three Year Return = α + β_1Gross Proceeds + β_2Reallowance Fee + β_3Offer Price Change + β_4Venture Capital Dummy + β_5Underwriter Reputation + ε,

where: Three Year Return is the abnormal return over three years and is defined as the holding period return of the IPO adjusted by the return on a matching benchmark firm based on size and market to book ratio; Gross Proceeds is the gross proceeds raised in the IPO; Reallowance fee is the ratio of reallowance to selling commission; Offer price change is the percentage change between the initial filing expected offer price and the final offer price; Venture capital dummy equals one when the IPO is venture capital backed and zero otherwise; and Underwriter reputation is the dollar volume of IPOs the lead investment bank managed during the sample period. The elasticity is defined as the product of the estimated coefficient and the ratio of the independent variable mean to the dependent variable mean.

Independent Variable	Empirical Prediction	Parameter Estimate (p-value)	Elasticity
Intercept		0.0171 (0.9335)	
Gross proceeds	-	-0.0013 (0.1157)	-1.2630
Reallowance fee		-0.0001 (0.9879)	-0.0341
Offer price change	-	-0.0093 (0.0004)	-0.7658
Venture backed	+	0.1378 (0.1977)	
Underwriter reputation	+	3.392 (0.0149)	1.9673
Sample Size		763	
R-square		0.0277	
F Value		4.323	

Table 9
Reallowance to Selling Concession Quintile Size Groups 1997-2017

Portfolios of IPOs occurring between 1997 and 2017 formed on gross proceeds and reallowance fee (conditional on proceeds). The reallowance/concession is the portion of the reallowance fee within the selling concession. The initial return is the percentage change from the offer price to the first-day closing price. One and three-year Abn. Rtn. are the abnormal returns over one and three years defined as the holding period return of the IPO adjusted by the return on a matching benchmark firm based on market capitalization (size) and book-to-market equity ratio. Price adjustment is the percentage change between the initial filing expected offer price and the final offer price. [a], [b], and [c] indicate the value is statistically different from zero at the 0.01, 0.05, and 0.10 levels, respectively.

Sample	Sample Size	Initial Return	1 Year Abn. Rtn.	3 Year Abn. Rtn.	Price Adjustment
Panel A. Quintile 1 (Smallest)					
Low Reallowance/Concession	117	14.22%[a]	-10.67%[c]	-22.69%[c]	-0.51%
Medium Reallow/Concession	139	9.87%[a]	-6.76%	-14.88%	-13.69%[a]
High Reallowance/Concession	145	8.00%[a]	-6.73%	-8.48%	-23.73%[a]
Panel B. Quintile 2					
Low Reallowance/Concession	134	39.67%[a]	12.09%	-31.56%[a]	10.65%[a]
Medium Reallow/Concession	145	21.57%[a]	-25.33%[a]	-30.82%[b]	-0.75%
High Reallowance/Concession	122	18.10%[a]	-17.92%[b]	-22.65%	-20.20%[a]
Panel C. Quintile 3					
Low Reallowance/Concession	143	64.31%[a]	-10.46%	-49.13%[a]	21.05%[a]
Medium Reallow/Concession	110	34.87%[a]	-18.07%[a]	-37.20%[a]	5.59%[a]
High Reallowance/Concession	149	14.83%[a]	-11.01%	-23.20%[b]	-4.43%[a]
Panel D. Quintile 4					
Low Reallowance/Concession	131	84.95%[a]	-30.15%[a]	-53.48%[a]	30.84%[a]
Medium Reallow/Concession	138	41.54%[a]	-19.17%[a]	-45.97%[a]	13.10%[a]
High Reallowance/Concession	132	13.44%[a]	-16.04%[a]	-32.17%[a]	-6.15%[a]
Panel E. Quintile 5 (Largest)					
Low Reallowance/Concession	133	49.17%[a]	-13.46%[b]	-28.72%[a]	21.11%[a]
Medium Reallow/Concession	133	15.77%[a]	-14.50%[a]	-25.29%[a]	5.82%[a]
High Reallowance/Concession	135	8.95%[a]	1.88%	-14.31%[c]	-7.74%[a]

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Table 10
Percentage Price Change Prior to Offer Quintile Size Groups 1997-2017

Portfolios of IPOs occurring between 1997 and 2017 formed on gross proceeds and price adjustment (conditional on proceeds). Price adjustment is the percentage change between the initial filing expected offer price and the final offer price. (Generally, low (high) price adjustments indicate offer price decreases (increases) and the medium price adjustment contains those issues with little or no change.) The initial return is the percentage change from the offer price to the first-day closing price. One and three-year Abn. Rtn, is the abnormal return over one and three years defined as the holding period return of the IPO adjusted by the return on a matching benchmark firm based on market capitalization (size) and book-to-market equity ratio. The reallow/concess is the portion of the reallowance fee within the selling concession. [a], [b], and [c] indicate the value is statistically different from zero at the 0.01, 0.05, and 0.10 levels, respectively.

Sample	Sample Size	Initial Return	1 Year Abn. Rtn.	3 Year Abn. Rtn.	Reallow/ Concess
Panel A. Quintile 1 (Smallest)					
Low Price Adjustment	137	7.35%[a]	-5.03%	-7.31%	35.08%[a]
Medium Price Adjustment	130	5.48%[a]	2.45%	-1.15%	28.62%[a]
High Price Adjustment	134	18.48%[a]	-20.84%[a]	-35.97%[a]	26.47%[a]
Panel B. Quintile 2					
Low Price Adjustment	134	8.19%[a]	-18.89%[a]	-27.89%[b]	27.63%[a]
Medium Price Adjustment	130	17.06%[a]	-16.39%[b]	-24.32%[b]	21.03%[a]
High Price Adjustment	137	53.55%[a]	3.09%	-33.36%[b]	19.09%[a]
Panel C. Quintile 3					
Low Price Adjustment	128	4.17%[a]	1.67%	-18.20%[c]	21.85%[a]
Medium Price Adjustment	142	23.64%[a]	-18.72%[a]	-40.48%[a]	18.52%[a]
High Price Adjustment	132	86.00%[a]	-20.30%[b]	-49.09%[a]	16.24%[a]
Panel D. Quintile 4					
Low Price Adjustment	154	5.62%[a]	-8.12%[c]	-21.94%[b]	19.73%[a]
Medium Price Adjustment	110	28.15%[a]	-15.07%[b]	-46.33%[a]	15.38%[a]
High Price Adjustment	137	107.10%[a]	-42.37%[a]	-66.83%[a]	14.06%[a]
Panel E. Quintile 5 (Largest)					
Low Price Adjustment	133	2.18%[a]	8.66%	-0.34%	19.55%[a]
Medium Price Adjustment	135	8.88%[a]	-7.63%[c]	-27.40%[a]	15.18%[a]
High Price Adjustment	133	62.82%[a]	-26.97%[a]	-40.39%[a]	13.61%[a]