Nepotism in IPOs:

Consequences for Issuers and Investors

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Abstract

IPO underwriters have an incentive to underprice an IPO when they allocate shares to their affiliated funds. We label this conflict of interest "supernepotism" and we analyze its effect on IPO pricing. Using a regression discontinuity design (RDD) on a novel hand-collected dataset, we find that higher allocations to underwriter-affiliated funds cause higher IPO underpricing. Our evidence suggests that supernepotism has monetary costs for issuers.

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I. Introduction

When taking a company public, an investment bank that is part of a banking group with an asset management arm has an incentive to underprice the IPO if it expects funds affiliated with its bank to receive IPO shares. We empirically examine this conflict of interest and document its consequences for IPO pricing. Our evidence supports the view that this incentive induces banks to underprice IPOs by economically significant amounts.

In the traditional IPO process, the underwriting bank has primary say over the offering price, as well as largely controlling the initial share allocation. When an IPO underwriter is affiliated with a fund manager, three potential conflicts of interest arise. First, the underwriter may allocate shares in overpriced ("cold") IPOs to its affiliated funds to ensure completion of the issue; Ritter and Zhang (2007) refer to this conflict of interest as the "dumping ground" hypothesis. Second, the underwriter may allocate shares in underpriced ("hot") IPOs to its affiliated funds to boost the performance of those funds; Ritter and Zhang (2007) refer to this conflict of interest as the "nepotism" hypothesis. Third, the underwriter may intentionally underprice the IPO when it expects its affiliated funds will receive IPO shares. To our knowledge this potential conflict of interest has not been investigated before. We label it the "supernepotism" hypothesis.

While fundamentally different, the nepotism and supernepotism hypotheses are not mutually exclusive. Under nepotism, the underwriting bank allocates more IPO shares to its affiliated funds once it realizes that the IPO is underpriced. The IPO issuer does not incur any incremental cost, relative to the allocation of those same underpriced shares to a different investor. Under supernepotism, however, the bank underprices the IPO with the intention of allocating shares to its affiliated funds, and it underprices the IPO more than if allocating shares to its affiliates was not possible. To benefit its asset management arm, the bank intentionally imposes a monetary cost on the IPO issuer.

Using a hand-collected dataset of U.S. IPO allocations, we find support for the supernepotism hypothesis in a regression discontinuity design (RDD) setting: a 1 percentage point increase in IPO allocations to affiliated funds leads to an estimated increase in underpricing of 5.4 percentage points, translating to an additional $11 million left on the table by the issuer. Discussing the plausibility of this estimate, we argue that the loss in underwriting fees due to the additional underpricing is more than offset by other benefits to the bank. Our evidence suggests that the conflict of interest inherent in the underwriter-fund manager association has real monetary costs for IPO issuers, in addition to the distortions affecting investors documented in the existing literature (Ritter and Zhang (2007)).

To construct our dataset, we rely on rule 10f-3 of the Investment Company Act, which requires investment companies to report their affiliated transactions to the U.S. Securities and Exchange Commission (SEC). Using reports from the SEC EDGAR database, we compile data on all IPO allocations to underwriter-affiliated funds between 2001 and 2013.[1] Our final dataset includes 1,294 IPOs underwritten by 64 banks with affiliates.

Identifying the causal effect of affiliated IPO allocations on underpricing is challenging, because allocations and prices are jointly determined. As the outcome of profit-maximizing decisions by investment banks, both are most likely affected by firm characteristics and other unobserved factors. We argue that rule 10f-3 provides the institutional setting we need to single out the effect we want to identify. This rule sets a threshold, requiring issuers to be at least three

[1]As detailed in Appendix A, we manually gather data from reports spanning 2001 to 2014, which constrains our sample to the period from 2001 to 2013.

years old before the underwriter can allocate shares to its affiliated funds. Therefore, the size and the probability of underwriter-affiliated allocations will jump discontinuously when the age of the issuing firm reaches the cutoff date. We use a fuzzy RDD setting to exploit this discontinuity and estimate the effect of the treatment (affiliated allocations) on the outcome (underpricing), while eliminating any observed or unobserved confounding factors. Intuitively, firms that go public at slightly more than three years of age are similar, on average, to firms that go public when slightly younger. Their IPOs should have similar levels of underpricing. If those levels differ, rule 10f-3 lets us estimate the causal effect of affiliated allocations on that underpricing.

A large body of literature investigates the role played by conflicts of interest within the IPO bookbuilding process, providing extensive evidence that underwriters allocate IPO shares in ways that could be detrimental to their issuers.[2] Several researchers examine the hypothesis that underwriters preferentially allocate IPO shares to favored investors, who give back part of the underpricing gains in the form of brokerage commissions (the "favored-investor conflict" hypothesis). Using an event-study methodology, Goldstein, Irvine, and Puckett (2011) find that underwriters' brokerage commission revenues are abnormally high in the period preceding hot IPOs. Consistent with Nimalendran, Ritter, and Zhang (2007), they find that one strategy used to increase commissions is to churn shares through round-trip trades in liquid stocks. Moreover, Reuter (2006) and Jenkinson, Jones, and Suntheim (2018) find a direct positive correlation between the dollar amount of commissions paid by a fund family to an investment bank and the family's allocations of underpriced IPOs underwritten by the same bank.

Other conflicts of interest with documented effects on IPO allocations include "laddering," which involves a quid-pro-quo arrangement between underwriters and their clients: Investors

[2]See Ljungqvist (2007) for a survey of the early literature.

receive IPO allocations in exchange for a promise to buy additional shares in the aftermarket (Griffin, Harris, and Topaloglu (2007)). Liu and Ritter (2010) focus on “spinning,” the practice of allocating hot shares to corporate executives to influence their decision to hire the investment bank for future services; they find that these executives are less likely to switch investment bankers in follow-on offers. In the U.S. market, Ritter and Zhang (2007) find some evidence of nepotism (underwriters favor their affiliated funds in the allocation of hot IPOs, mainly during the internet bubble period). Mooney (2015), however, finds large cross-country differences in the types of conflicts of interest that affect the allocation of IPO shares to affiliated funds.

While we are not the first to propose a causal relationship between discretional allocations and underpricing, our paper makes several distinct contributions. First, we extend this causal hypothesis to the context of allocations to affiliated funds (our “supernepotism hypothesis”). Second, we analyze the interaction between the supernepotism conflict and the favored-investors conflict. For supernepotism to affect underpricing, it must be the case that there is an incremental benefit associated with allocating underpriced shares to affiliated investors, relative to favored, but unaffiliated, investors. We argue that the allocations to affiliated investors also result in increased kickback revenues from the favored investors; we sketch a model to illustrate our logic. Our analysis suggests that the supernepotism conflict and the favored-investors conflict reinforce each other. Third, we single out the causal effects of affiliated allocations on IPO underpricing, using a careful identification strategy. Fourth, we hand-collect our dataset from actual IPO allocations rather than relying on end-of-quarter holdings. Among other benefits, our data and findings enable us to reinterpret the results of earlier research. For example, consistent with the existence of costly agency problems, Berzins, Liu, and Trzcinka (2013) find that bank-affiliated funds significantly underperform independent funds. Using quarterly holdings data, Hao and Yan

(2012) find one reason behind this underperformance to be that affiliated funds tend to hold a disproportionately large amount of cold equity issues underwritten by their affiliated banks. Our study indicates that these results are unlikely to be driven by allocations in the IPO primary market. Other factors, which go beyond the scope of this paper, appear to be driving the results of those previous studies (e.g., affiliated funds' trading choices in the IPO aftermarket).

II. Intuition and Motivation

Conflicts of interests faced by IPO underwriters have long been documented. For example, it is well-known that underwriters often underprice IPOs and allocate shares to favored investors in return for kickbacks in the form of trading commissions. We postulate another reason for an underwriter to act in a self-serving manner: If the underwriter is part of a banking group with an asset management arm, it has an incentive to underprice the IPO to benefit its affiliated funds. We call this conflict "supernepotism."

In this section we sketch a simple model to clarify the tradeoffs faced by the underwriter. One might expect supernepotism to mitigate, or be tempered by, the favored-investors conflict. Instead, these two conflicts of interest appear to reinforce each other. The key intuition emerging from our analysis is that allocating shares to affiliated funds, and the extra underpricing associated with it, also benefits favored funds, and thus indirectly boosts the underwriter's kickbacks.[3]

Consider an underwriter who is conducting the IPO of an unlevered firm. There are two possible equally likely states: good and bad. The IPO firm is worth \$1 in the good state and 0 in the bad state. The existing shareholders of the firm are selling 100% of their stakes and no new

[3]Details and proofs of our model can be found in the Web Appendix.

funds are raised, so the fair price of this IPO when its state is not known is \$0.5. Everyone is risk neutral and there is no discounting. The underwriter decides which investors to include in the IPO, the price at which the IPO shares are sold (i.e., P, with $P \in (0, 1)$), and the final allocation of shares to the investors. Using the proceeds from the sale, the firm's existing shareholders pay the underwriter a commission, cP, at the completion of the IPO, where c is the commission spread.

Our model includes three types of investors:

- **Favored investors** receive allocations only when the IPO is underpriced. These clients pay kickbacks to the underwriter. If they pay the underwriter a fraction, k, of their expected revenues from investing in the IPO, and if the IPO is underpriced, then the underwriter allocates IPO shares to them. If these clients do not pay kickbacks, then they do not receive allocations.[4]
- **Affiliated funds** are managed by the underwriter and can receive IPO allocations. We model the incentives of the underwriter by assuming that its profit function is proportional to these funds' underpricing gains at the rate m. The parameter m is the percentage management fee earned by the fund managers; it captures, in reduced form, the present value of any additional gains from larger fund inflows due to the underpricing.
- **Regular investors** include other independent institutions and retail investors. They can decide to participate in the IPO or not. Regular investors consider the fact that the underwriter may give preferential treatment to favored clients and affiliated funds. We assume that the underwriter needs regular investors to participate, or the IPO fails.

The timeline of our model is as follows:

[4]This way of modeling the kickback game is consistent with Goldstein et al. (2011), who show that institutional investors pay most of their kickbacks during the 10 days preceding the IPO, and thus only know the expected underpricing.

- Time 0 ("Roadshow" stage): The underwriter announces the IPO price (P) and chooses the investors to whom to offer the IPO. Everyone observes P and to whom the IPO is offered.
- Time 1 ("Participation decision" stage): Regular investors decide to participate or not. Favored investors pay kickbacks if they were offered the IPO.
- Time 2 ("Final allocations" stage): The underwriter observes the true state of the firm and makes the final allocation of shares within the subset of investors to whom the IPO was offered. The IPO is completed.
- Time 3 ("Payoffs realization" stage): The IPO firm's final payoffs are realized, and all outstanding claims are settled.

Our analysis shows that the equilibrium outcomes of this model are as follows. If there are only regular investors, the underwriter does not underprice the IPO. To maximize underwriting commissions, the underwriter chooses the highest possible IPO price, which is the fair price \$0.5.[5] When the underwriter can also allocate shares to favored investors, but not to affiliated funds, the equilibrium outcome is intuitive: When $k < c$, the underwriter has no incentive to allocate any shares to favored investors; it allocates all the shares to regular investors and does not underprice the IPO. When $k > c$, the underwriter allocates some shares to favored investors; the regular investors face a winner's curse situation, and the underwriter must underprice the IPO to ensure their participation. Depending on how high k is, the underwriter is limited either by the participation constraint of the regular investors, or by that of the IPO firm.

So far, it might appear that the underwriter allocates shares to whichever investor category maximizes its direct linear payoff, subject to the participation constraints of the regular investors and of the IPO firm. This conclusion is not correct in the situation of interest to us, however.

[5]In our model, regular investors play a role similar to that of uninformed investors in Rock (1986).

When it can allocate shares to all three types of investors – regular investors, favored investors, and affiliated funds – the underwriter may allocate shares to affiliated funds even when $m < c$ and $m < k$. This seemingly paradoxical outcome arises from complementarity effects between allocations to favored investors and those to affiliated funds. Such complementarities are especially prominent when $k > c$ and when the IPO firm has a low reservation price (a realistic assumption for IPO firms that are only a little more than three years old) making it possible for the underwriter to choose a high level of underpricing. First, for moderately high values of k, higher allocations to affiliated funds imply a higher level of underpricing in equilibrium, to compensate regular investors for the winner's curse. This higher level of underpricing increases the profits of favored investors, and so also increases the underwriter's kickbacks. Therefore, increasing allocations to affiliated funds may increase the kickbacks from favored investors. Second, for very high values of k, the underwriter has an incentive to underprice as much as possible and to allocate as many shares as possible to both favored investors and affiliated funds, subject to the participation constraint of the IPO firm (regular investors make a profit in expectation).

Overall, the key insight from this simple model is that, given reasonable assumptions, allocations to affiliated funds and to favored investors work together to further the underwriter's interests. The very possibility that the underwriter may allocate shares to its affiliated funds increases the winner's curse situation of regular investors. Keeping regular investors on board requires further underpricing, which boosts the returns of the underwriter's affiliated funds and the kickbacks from its favored investors.

III. Data and Summary Statistics

Section 10(f) of the Investment Company Act of 1940 prohibits underwriters from selling shares of a security to funds that are affiliated with a member of the underwriter's syndicate. This regulation was amended in 1958 and in subsequent years to exempt certain transactions. During this study's sample period, rule 10f-3 of the Act permitted funds to buy securities underwritten by their parent banks if certain conditions are satisfied. Four of these conditions are of particular importance here: (*i*) the issuer must have been in continuous operation for at least three years prior to the offering, including the operations of any of its predecessors; (*ii*) the securities are offered under a firm-commitment contract;[6] (*iii*) the affiliated transaction is executed by a syndicate member other than the affiliated underwriter;[7] (*iv*) any transaction pursuant to rule 10f-3 is reported on the investment company's SEC form N-SAR, attaching a written record of the details of each transaction.

The first three items allow us to identify IPOs that are eligible for 10f-3 transactions, that is, IPOs whose shares can be allocated to underwriter-affiliated funds. The last item allows us to hand collect a novel dataset of IPO allocations received by funds affiliated with the underwriters.

In the following subsections, we describe our sample selection criteria, define the main variables used in our analyses, and provide summary statistics.

[6] In a firm-commitment contract, the underwriter guarantees to purchase all the securities offered by the issuer, regardless of whether or not they can sell them to investors.

[7] For example, consider Issuer X, underwritten by Banks A and B. Rule 10f-3 says that funds affiliated with Bank A can receive allocations only from Bank B and, vice versa, funds affiliated with Bank B can receive allocations only from Bank A.

III.A. IPO Data

We use the SDC database to identify IPOs made in the United States from 2001 to 2013.[8] We exclude all American Depository Receipts (ADRs), Real Estate Investment Trusts (REITs), unit and rights offerings, closed-end funds, IPOs with SIC codes between 6000 and 6199, and IPOs with an offer price less than $5. Moreover, we require IPOs to have a match with the CRSP database within seven calendar days from the issue. These filters leave us with 1,294 IPOs.

From SDC and CRSP we get the name of the issuer and its SIC code, the nation where the issuer is located, the CUSIP and PERMNO numbers of the security issued, the issue date and filing date, the offer price and the original midpoint of the filing price range, the first day closing price, the number of shares issued and whether they are primary or secondary shares, the total assets of the issuer before the IPO,[9] the primary exchange where the shares are listed, the identity and number of lead managers and other syndicate members, the underwriting gross spread and the type of underwriting contract under which the securities are issued, and a flag identifying venture-backed IPOs. We match our sample with data available on the IPO data website managed by Jay R. Ritter at the University of Florida to find the issuers' founding years and the underwriters' reputation rankings.[10] When the founding year is not available on the Ritter website, we use the founding date available on SDC. Underwriters' reputations are ranked on the Ritter website using numbers ranging from 1 (lowest) to 9 (highest). These rankings are described in Loughran and Ritter (2004) and are an adjustment of the Carter and Manaster (1990) rankings. Table 1 describes the IPO variables we compute by matching the SDC, CRSP, and Ritter data.

[8]We clean the database of known mistakes by manually applying the corrections listed, as of April 2014, on the IPO database managed by Jay R. Ritter at the University of Florida: https://site.warrington.ufl.edu/ritter/ipo-data/.

[9]When the total assets pre-IPO are missing in the SDC data, we proxy them by subtracting the total proceeds of the IPO from the total assets after the IPO, taking the latter from COMPUSTAT.

[10]The link is: https://site.warrington.ufl.edu/ritter/ipo-data/

[Table 1 about here.]

We define an IPO to be eligible for affiliated transactions, pursuant to rule 10f-3, if each of the following four conditions is met: (*i*) $Age \geq 3$ years; (*ii*) $FirmCommitment = 1$; (*iii*) $NumberSyndicateMembers > 1$; (*iv*) at least one lead underwriter has been involved in a 10f-3 transaction in our sample.

The first three conditions are a direct consequence of the rule 10f-3 requirements. The rationale behind our fourth condition is that underwriters who have never been involved in a 10f-3 transaction might not have any affiliated funds.[11] From our original sample of 1,294 IPOs, we count 1,086 IPOs that are eligible for affiliated transactions; 208 IPOs do not satisfy at least one of the four requirements. Figure 1 plots the number of IPOs by year, distinguishing between eligible and non-eligible IPOs. The percentage of eligible IPOs, at about 84% on average, appears to be stable in the period 2001 to 2013.

[Figure 1 about here.]

Table 2, Panel A, provides summary statistics for the 1,086 eligible IPOs (Columns 2-4), the 208 non-eligible IPOs (Columns 5-7), and the sample of 217 IPOs used in our main RDD analyses (Columns 8-10). The RDD sample comprises 152 eligible IPOs with $3 \leq Age < 6$ years and 65 IPOs that satisfy all the other eligibility requirements but are less than three years old. All non-dummy variables except Age are winsorized at the 2.5% level.[12] Table 2 shows that non-eligible IPOs differ from eligible IPOs, in that they are smaller and younger, have lower underpricing, and are less likely to be underwritten by a top-ranked underwriter. Except for the

[11] This condition may not perfectly identify IPOs whose underwriters have affiliated funds. We cross-checked our data with the list of affiliated underwriters in Pratobevera (2024), confirming that our classification is highly reliable.

[12] We do not winsorize Age because it is the forcing variable in the RDD setting; see section IV.

firms' ages, overall the RDD sample is similar to the total sample of eligible and non-eligible IPOs.

[Table 2 about here.]

III.B. Allocation Data

At the time of our study, investment companies reported their affiliated transactions to the SEC through their filing of N-SAR forms. We download from the SEC EDGAR database all the N-SAR forms filed from January 2001 to December 2014 and collect data on affiliated IPO allocations in the period 2001 to 2013. (Appendix A explains the downloading, parsing, and matching procedures.) Using this data, we build our Affiliated Allocations dataset, which contains: IPO identifiers (issuer name, CUSIP, and issue date); the name of the affiliated fund and/or the subportfolio of the fund and/or the investment company that receives an allocation; the number of shares received by the affiliated fund and/or by the subportfolio of the fund and/or by the investment company the fund is managed or advised by; the name(s) of the affiliated underwriter(s); and the name(s) of the underwriter(s) from whom the shares were purchased, often referred to as the "broker" in the N-SAR filings. Thus, we can observe the number of shares allocated at the IPO-investor-broker level.

In our main analyses, we aggregate affiliated allocations at the IPO level, letting A_i be the total number of shares allocated to affiliated funds in IPO i. Then we build the two main variables of our analysis: $AffiliatedAllocPerc$ and $AffiliatedAllocDummy$. The variable $AffiliatedAllocPerc$ is the percentage of the issue allocated to affiliated funds. If N_i is the number of shares issued in IPO i, then: $AffiliatedAllocPerc_i = \frac{A_i}{N_i} \times 100$.

$AffiliatedAllocDummy$ is a dummy variable equal to one if at least one share is allocated to an affiliated fund: $AffiliatedAllocDummy_i = \mathbb{1}(A_i > 0)$.

The N-SAR filings provide information about affiliated allocations only. We also build a proxy for the percentage of the issue allocated to independent funds, that is, to funds not affiliated with the underwriters of a given IPO. First, we match the SDC sample to the Thomson Financial CDA/Spectrum 1&2 database (s12) using CUSIP numbers. Then we compute the total holdings held by mutual funds at the first reporting date after each IPO, excluding non-U.S. mutual funds and mutual funds with investment codes of 5, 6, or 8. We let H_i be the total number of shares held by mutual funds in company i at the first reporting date after the IPO of company i. Then we build a proxy for the percentage of the issue allocated to independent funds as:[13]

$IndependentAllocPerc_i = \frac{H_i - A_i}{N_i} \times 100$.

To reduce the impact of potential data errors and outliers, we winsorize the allocation variables $AffiliatedAllocPerc$ and $IndependentAllocPerc$ at the 2.5% level. Table 2, Panel B, summarizes the allocation data at the issuer level for the 1,086 eligible IPOs (Columns 2-4), the 208 non-eligible IPOs (Columns 5-7), and the subsample of 217 IPOs used in our main RDD analyses (Columns 8-10). Of the eligible IPOs, 611, or about 56%, involve at least one affiliated transaction and, on average, 1.44% of the issue is allocated to funds affiliated with the underwriters. Conditional on involving at least one 10f-3 transaction, then, the average percentage allocated to affiliated funds is 2.57% (1.44 divided by 0.56). The median affiliated allocation is lower than the mean, indicating a positive skewness. The average percentage of the issue allocated to independent funds is 18.3%.

[13]This proxy is noisy for two reasons. First, it is affected by aftermarket trading of both affiliated and unaffiliated funds. Second, it is affected by the different coverage of funds in our Affiliated Allocations dataset and in the s12 database.

Interestingly, underwriters allocate shares of non-eligible IPOs to their affiliated funds in 17 IPOs, about 8% of such IPOs. Eight of these IPOs do not satisfy the age requirement, being less than three years old. There are several reasons why underwriters might have allocated shares to their affiliated funds in these cases. First, we may have misclassified these IPOs as "non-eligible": Errors in the issuers' founding dates or the existence of unknown predecessors could have led us to miscalculate their age. Second, the age is correct, but no enforcement action was recommended by the SEC. In a private conversation, an SEC expert pointed out that the Securities and Exchange Commission takes into account the general principles behind the 10f-3 rule when interpreting and applying it. Consequently, certain transactions that seem to formally violate the rule could, in fact, be allowed.[14] Third, the underwriters might have broken the 10f-3 rule, allocating shares of non-eligible issuers to their affiliated funds. When a search on Google provides information consistent with the founding dates contained in our dataset, we flag the IPO as non-eligible due to the firm's age.

Of the remaining nine non-eligible IPOs, one does not satisfy the firm commitment requirement, while the other eight do not satisfy the lead underwriter requirement, meaning that none of their lead underwriters has ever been involved in a 10f-3 transaction in our sample. In these eight IPOs, affiliated transactions involve other syndicate members only.

Figure 2 shows the average allocations to affiliated and independent funds over the period 2001 to 2013 for the 1,086 eligible IPOs. Panel A shows that the percentage of IPOs with

[14]One popular example dates to 2008, when the Goldman Sachs Trust requested assurance that the SEC would not have recommended any enforcement action related to some affiliated allocations of fixed-income securities issued by companies that were less than three years old. These securities were co-issued with and 100% guaranteed by another company that was more than three years old and, thus, was compliant with the 10f-3 rule. The SEC concluded that the characteristics of the co-issue and the 100% guarantee were consistent with the aim of the rule, which is to avoid unmarketable securities being dumped to affiliated funds. It assured Goldman Sachs that it would not have recommended any enforcement action. See the SEC's interpretative letter for more details: https://www.sec.gov/divisions/investment/noaction/2008/goldmansachstrust081908.htm

affiliated allocations ranges from a minimum of 41% in 2008 to a peak of 77% in 2009, with no apparent trend in the period 2001 to 2013. The average percentage allocation to affiliated funds ranges from a minimum of 0.87% in 2005 to a peak of 2.72% in 2009 and behaves similarly to the average percentage of the issue allocated to affiliated funds conditional on IPOs involving at least one affiliated transaction. These results mean that in periods when underwriters are more likely to allocate shares to their affiliated funds, the size of the affiliated allocations tend, on average, to be larger.

We notice no apparent increase in affiliated allocations after 2002, when the SEC amended rule 10f-3, loosening some of its constraints. In particular, after 2002 the maximum amount of shares that an underwriter can allocate to its affiliated funds (the "percentage limit," or 25% of the issue) applies to the principal underwriter only. This constraint is not binding in the IPO allocations market, as affiliated allocations are far below the percentage limit imposed by rule 10f-3.

[Figure 2 about here.]

To assess the contribution of our novel dataset, it is worth comparing these summary statistics with those of Ritter and Zhang (2007), as they use the Spectrum 1&2 holdings to proxy for affiliated allocations. The only overlapping year between our research and theirs is 2001. Ritter and Zhang (2007) find that affiliated funds report positive holdings for approximately 26% of the IPOs in 2001, while we find the true percentage of IPOs involving affiliated allocations, based on N-SAR filings, is about 71%. Moreover, they find that the average allocation – conditional on the allocation being greater than zero – is 0.7%, while, according to the N-SAR filings, it is 2.93%. These numbers suggest that using the Spectrum 1&2 holdings to proxy for affiliated allocations might considerably understate their prevalence and size. To further investigate the merits of our novel dataset, we identify affiliated funds in the Spectrum 1&2 database and build a proxy of their IPO allocations based on end-of-quarter holdings, as in the prior literature. We find that the correlation between actual allocations and the end-of-quarter holdings of affiliated funds in eligible IPOs is only 0.52. The average end-of-quarter holding of affiliated funds is 0.59%, which is much lower than their average IPO allocation (1.44%). Affiliated funds have a positive end-of-quarter holding in 30% of the IPOs, while receiving a positive allocation in 56% of them. More importantly, the unconditional correlation between underpricing and the percentage of affiliated allocations is 0.12, while the correlation between underpricing and the percentage of affiliated end-of-quarter holdings is only 0.03. Average underpricing is 19.4% in IPOs with affiliated allocations and 7.6% in IPOs with no affiliated allocations; average underpricing is 18.3% in IPOs with affiliated end-of-quarter holdings and 12.5% in IPOs with no affiliated end-of-quarter holdings.

IV. The Effect of Affiliated Allocations on Underpricing

Rule 10f-3 provides the institutional setting we need to design a quasi-experiment to test our supernepotism hypothesis and identify a causal link between affiliated allocations and underpricing. For the underwriter to be permitted to allocate shares to its affiliated funds, rule 10f-3 requires issuers to be at least three years old. Therefore, the probability of allocating some shares to affiliated funds should discontinuously increase at the three-year cutoff point. This source of exogenous variation allows us to implement a fuzzy regression discontinuity design

(RDD).[15]

In RDD terminology, $Underpricing$ is the "outcome" variable; our affiliated allocation measures – $AffiliatedAllocPerc$ and $AffiliatedAllocDummy$ – are the "treatment" variables; and Age is the "forcing" variable that determines the assignment-to-treatment status through the three-year cutoff. We are interested in the causal effect of the treatment on the outcome. A fuzzy RDD exploits the discontinuous variation in the treatment status provided by the forcing variable to identify that causal effect.

The RDD framework helps us overcome the joint endogeneity of affiliated allocations and underpricing by letting us approximate an ideal experimental setup, in which the possibility of allocating shares to underwriter-affiliated funds is randomly assigned. Consider an underwriter who is hired by several firms of random ages to perform their IPOs. Firms that choose to go public at two years old probably differ in many ways from those that go public in their twenties. These IPO-specific differences may influence both the allocation and the pricing decisions of the underwriter, making it difficult for us to identify causal effects. If we consider an arbitrarily small neighborhood around the three-year cutoff point, however, we can compare firms that differ discontinuously in their treatment probability (that is, firms just over and under three years old), but do not differ greatly in other ways.

We assume that only the treatment (the affiliated allocations) will change discontinuously at the cutoff point, while the conditional expectation function of all other factors (both observable and unobservable) is continuous. We discuss the validity of this identifying assumption in section IV.A.

[15]As observed in section III, the three-year cutoff does not perfectly determine the affiliated allocation decision, either below or above the threshold. Therefore, a sharp RDD does not fit our setting.

Our identification strategy is illustrated in Figure 3. Consider an underwriter who faces supernepotism incentives and has a profit function such that its optimal choice of the offer price, P, as a function of its affiliated allocations, α, is given by $P^*(\alpha)$.[16] If the underwriter complies with rule 10f-3, its affiliated allocations are constrained to zero when the age of the IPO falls below the cutoff. In this case, the affiliated allocations and optimal price are given by the pair $(0, P^*(0))$. When the age of the IPO is above the cutoff, however, the underwriter can optimally choose P and α to maximize its profits. Letting $\bar{\alpha}$ be the fraction of the issue that can be allocated to affiliated funds, the underwriter chooses the pair $(\bar{\alpha}, P^*(\bar{\alpha}))$. The cutoff thus identifies movements along the $P^*(\alpha)$ function, allowing us to estimate the change in the optimal offer price caused by a change in allocations to affiliated investors. Since we implement a fuzzy RDD, we estimate a Local Average Treatment Effect (LATE), that is, the effect of affiliated allocations on underpricing for units that comply with rule 10f-3.

[Figure 3 about here.]

To focus our RDD analysis on observations for which the three-year cutoff is binding, in this section we restrict our sample to eligible IPOs (1,086 observations) and IPOs that do not meet the age requirement (65 observations). All are syndicated IPOs issued under a firm-commitment contract whose lead underwriters have been involved in at least one 10f-3 transaction in our sample.

The remaining 143 IPOs that, regardless of their age, do not meet at least one of the other 10f-3 requirements are useful for placebo tests only.

[16] Within the stylized model of Section II, $P^*(\alpha)$ illustrates the optimal IPO price when the kickback and nepotism conflicts are complements and the binding participation constraint is that of regular investors.

IV.A. Relevance and Exogeneity: Graphical Analysis and Discussion

We follow the RDD literature (Imbens and Lemieux (2008), Lee and Lemieux (2010)) in providing graphical evidence that supports the relevance and exogeneity of the three-year cutoff.

For it to be a valid instrument in a fuzzy RDD setting, the cutoff must discontinuously affect the treatment variable. Figure 4 plots the average value of the variables $AffiliatedAllocDummy$ and $AffiliatedAllocPerc$ by one-year age groups (bins). Panels A and B show that the probability of receiving the treatment jumps at the cutoff. The probability that an IPO involves a 10f-3 transaction is less than 20% for IPOs below the cutoff, but jumps to more than 50% just above it. A similar pattern holds for the average percentage of the issue allocated to affiliated funds. As shown in Panels C and D, it is less than 0.5% below the cutoff, but jumps to much more than 1% above it.

[Figure 4 about here.]

If the cutoff affects underpricing through a discontinuous change in affiliated allocations, then we should observe a jump in the outcome variable at the cutoff point (this jump is known as the intent-to-treat effect). Figure 5 plots the average underpricing by age bins. Underpricing shows a large, clear jump at the cutoff, from about 5% to more than 15%. This jump in underpricing at the cutoff point is consistent with supernepotism. It cannot be explained by nepotism.

[Figure 5 about here.]

The exogeneity of the cutoff is not testable. However, we can check to see if the implications of exogeneity hold in our setting.

In principle, the three-year cutoff could be endogenous. Underwriters do have some control over the length of the IPO process, and they might time their IPOs so as to make them eligible for 10f-3 transactions. Although appealing, this argument is not supported by the evidence. If underwriters were manipulating the length of the IPO process, then we would see a discontinuity, in the form of a jump or a spike, in the variable $LengthIPOprocess$ at the cutoff point: Three-year-old firms would experience longer IPO processes because of their underwriters' timing strategy. Figure 6, Panels B-D, show this not to be the case. There is no evidence of a discontinuity at the cutoff point for IPOs in general (Panel B), hot IPOs (Panel C), or cold IPOs (Panel D), thus ruling out systematic and selective timing by underwriters. (Hot (cold) IPOs are defined as IPOs with a positive (non-positive) price adjustment during the IPO process.)

Furthermore, if manipulation were a concern, then we might expect a particular group of IPOs to be subject to it: firms that start their going-public process before they are three years old, but complete it afterward. We observe that only 17% of IPOs that start the process when they are two years old complete it when they are three years old or older. (For comparison, 37% of firms that start the process when they are three years old complete it when they are four years old or older.) In these two-year-old IPOs, the average underpricing is 2%, suggesting that their timing, if any, is unrelated to nepotism incentives.

[Figure 6 about here.]

Another possibility is that the underwriter manipulates the age of the issuer by postponing the filing date. Delaying its beginning leaves the length of the IPO process unchanged, preventing us from detecting this manipulation of three-year-old firms in Figure 6, Panel B, and invalidating our design. We find this argument unconvincing for three reasons. First, underpricing is not the underwriter's sole objective. The desire to accomplish the IPO, and not miss a window of opportunity, pushes the underwriter to not delay the start of the process, as the issuer might otherwise turn to a competing underwriter to complete the IPO. Thus, competition among underwriters reduces the scope for manipulation. Second, the RDD setting is invalid only if underwriters can precisely manipulate the assignment variable (Lee and Lemieux (2010)). It is unlikely that an underwriter could do so before starting the IPO process, as its length is a random variable over which the underwriter does not have full control.[17] Third, if underwriters were systematically manipulating firms' ages, then we would observe a jump in the density of the variable Age at the cutoff point. Figure 6, Panel A, shows this not to be the case. Overall, the evidence of non-manipulation seems to hold also at the underwriter level. Figure 7 plots by age bin the number of IPOs underwritten by the most important underwriters.[18] Again, there is no general discontinuity in the number of IPOs underwritten by each underwriter at the cutoff point; only one (Wells Fargo) shows a spike.

[Figure 7 about here.]

The identifying assumption of a regression discontinuity design is that the conditional expectation functions of all observable and unobservable factors related to the outcome – other than the treatment variables – are continuous at the cutoff point. We cannot test whether this assumption holds for unobservable factors, but in Figure 8 we plot the average value of the observable covariates by age bins. The figure shows no clear discontinuities in the conditional expectation functions of any of these covariates. Interestingly, the main predictor of underpricing

[17]The random component here includes factors that make it not fully predictable, such as the processing capacity of the SEC, indications of interest collected during the bookbuilding process, last minute news, pressures from the firm to complete the IPO, etc.

[18]The 14 most important underwriters are those that are involved in 10f-3 transactions in at least 25 IPOs in our sample. See the Web Appendix for additional details.

– the variable $Adjustment$ – is continuous at the cutoff point. Some variables ($NumberLeadManagers$ and $NumberSyndicateMembers$) show a spike at the three-year cutoff, but this spike does not seem to be a discontinuity in the conditional expectation function, which might plausibly be continuous. Overall, the expectation functions of the covariates conditional on age do not seem to be discontinuous at the cutoff point.

[Figure 8 about here.]

Similarly, Figure 9 plots the number of IPOs by age in each of the 12 Fama-French industries. The histograms do not show discontinuities in any industry, thus suggesting that industry composition is continuous at the three-year cutoff.

[Figure 9 about here.]

Another identification concern that we need to address stems from the goal of rule 10f-3, which is to prevent underwriters from dumping unmarketable securities on their affiliated funds. The regulators might have chosen the three-year threshold because the IPOs of firms in their early years are more likely to be unmarketable, thus resulting in lower average underpricing. This argument, though plausible, does not in itself affect the RDD, which focuses on discontinuities at the cutoff point. It suggests, however, that it might be important to control for the relation between underpricing and age in our regressions.

IV.B. Local Linear IV Results

In this subsection, we estimate the effect of underwriter-affiliated allocations on underpricing using a fuzzy RDD.

Let x_i be the age of firm i at the IPO date minus the cutoff level, $x_i = Age_i - 3$, and let z_i be a dummy variable identifying firms that are at least three years old, $z_i = \mathbb{1}(x_i \geq 0)$. We then estimate several specifications of the following local linear IV model, where $Alloc_i$ is one of our two measures of affiliated allocations, $AffiliatedAllocPerc_i$ or $AffiliatedAllocDummy_i$, and $Underpricing_i$ is the first day return:

$$\begin{cases} Underpricing_i = \beta_0 \, + \, \beta_1 Alloc_i \, + \, \beta_2 x_i \, + \, \beta_3 z_i x_i \, + \, e_i, \quad with \; x_i \in [-h, h-1], & (1) \\ Alloc_i = \gamma_0 + \, \gamma_1 z_i \, + \, \gamma_2 x_i \, + \, \gamma_3 z_i x_i \, + \, v_i, \qquad with \; x_i \in [-h, h-1]. & (2) \end{cases}$$

As discussed in subsection IV.A, we assume that $\mathbb{E}(e_i|x_i)$ is continuous at the cutoff point. Following Imbens and Lemieux (2008), we estimate the model via 2SLS, using z_i as the instrumental variable for $Alloc_i$, in a neighborhood of the cutoff.

Our RDD setting faces three distinct challenges. First, the forcing variable Age is discrete; we observe it only at the year level. Second, Age is measured with noise: Given its definition (see Table 1), some truly n-year-old firms might fall into the $n+1$ age bin, generating some possible misclassification around the cutoff. Third, the number of values that the forcing variable can take around the threshold is low, with only three distinct values below the cutoff. These three issues affect our choice of the bandwidth and standard errors to use.

Concerning bandwidth, h, the trade-off we face goes beyond the usual one related to sample size, between bias and variance. If we choose $h = 1$, then we use observations relatively close to the cutoff point, which are more likely to meet the random assignment condition. Given the discrete nature of our forcing variable, however, in this case we would not be able to control for the underlying relation between $Underpricing$ and x. If we choose an $h > 1$, for example

$h = 3$, then we can control for a local linear relation between the outcome variable and our discrete forcing variable. However, we do so at the cost of using observations that are relatively far from the cutoff point and are therefore less likely to meet the random assignment condition.

Concerning standard errors, clustering by the forcing variable is popular in the literature on RDD (Lee and Card (2008)). However, Kolesàr and Rothe (2018) warn that clustering by the forcing variable can lead to serious over-rejection problems when the number of clusters is low. In particular, they show that clustered standard errors perform worse than robust standard errors. Through simulations (unreported here), we confirm that Kolesàr and Rothe's concerns persist in our particular setting, with its low number of clusters and its possible misclassifications around the cutoff. We find that clustered standard errors face a major over-rejection problem in our setting, while robust standard errors seem to be fairly conservative. However, the power of our test is very low when we choose $h = 2$ or $h = 3$ and control for the underlying relation between underpricing and age.[19]

Based on this reasoning, we use robust standard errors and perform our analysis using three symmetric bandwidth levels ($h = 1$, $h = 2$, and $h = 3$) to check the robustness of our results, as reported in Table 3.

[Table 3 about here.]

Consistent with the supernepotism hypothesis, the coefficients of our affiliated allocation variables are positive in all specifications; they are statistically significant at conventional levels in all specifications but one. Focusing on model 6 of Panel A, which controls for changes in the underlying relation between the outcome and the forcing variables, we find that a 1 percentage

[19]Our simulations show that the power of a two-sided 5% test can be as low as 15%, depending on parameter values.

point increase in the fraction of the issue allocated to affiliated funds increases underpricing by about 5.4 percentage points. Table 3 also reports the first-stage F statistic, which is always bigger than 10, suggesting that the instrument z is not weak.

For completeness, Table 4 reports the estimates of the reduced-form regression (equation (3)). Results overall are consistent with Figure 5 and Table 3.

$$Underpricing_i = \theta_0 \ + \ \theta_1 z_i \ + \ \theta_2 x_i \ + \ \theta_3 z_i x_i \ + \epsilon_i \quad with\, x_i \in [-h, h-1] \quad (3)$$

[Table 4 about here.]

IV.C. Placebo IPOs

If the three-year cutoff affects underpricing only through affiliated allocations, then we should observe no discontinuities in the outcome variable when the cutoff is not binding.

Underwriters of non-eligible IPOs (such as non-syndicated IPOs) cannot allocate shares to their affiliated funds, regardless of the age of the issuer, and so should show no jump in underpricing at the cutoff. Figure 10 plots the average underpricing by age bins for our sample of non-eligible IPOs. As expected, we see no evidence of discontinuities at the three-year cutoff.

[Figure 10 about here.]

Since the three-year cutoff set by rule 10f-3 is specific to U.S. regulations, we should observe no jump in underpricing at the cutoff for non-U.S. IPOs. We verify this fact using an SDC sample of 456 European firm-commitment IPOs issued in the period 2001 to 2013.[20] In

[20] In addition to the usual filters, we require the founding date to be non-missing in the SDC database. We compute underpricing using the closing prices available in SDC.

Figure 11 we plot their average underpricing by age bins and find no evidence of discontinuities at the three-year threshold.

[Figure 11 about here.]

Following the RDD literature (Imbens and Lemieux (2008)), we check that there are no jumps at non-discontinuity points, that is, where the effect on underpricing should be zero. We define three arbitrary thresholds: the median value of age conditional on $Age > 3$, which is 11 years; the 25th percentile of age conditional on $Age > 3$, which is 7 years; and the 75th percentile of age conditional on $Age > 3$, which is 25 years. Figure 12 plots the average underpricing by age bins around these arbitrary thresholds, and we see no evidence of discontinuities.

[Figure 12 about here.]

IV.D. How Realistic Are Our RDD Estimates?

How plausible is our estimate of the additional underpricing due to affiliated allocations? For underwriters to engage in supernepotism, the loss in underwriting fees must be less than the sum of: 1) the benefits to the asset management arm, and 2) the impact on kickbacks from favored investors. The loss to the IPO issuer, due to this additional underpricing, can be estimated as follows: From Table 2, the average proceeds in our RDD sample are $196 million, and the average allocation to affiliated funds is 1.02%. The RDD regression estimate in Table 3 indicates that the additional underpricing resulting from one percentage point of affiliated allocations is 5.43%. Therefore, the additional average underpricing due to affiliated allocations is 1.02*0.0543=5.54%, and the additional average money left on the table is 0.0554*196=$11 million. From Table 2, the average gross underwriting spread is 6.63%. Therefore, the average loss in underwriting fees due to supernepotism is 0.0663*11=$0.73 million.

The benefits of these affiliated allocations to the asset management arm can be assessed as follows: For the subset of our funds that we can reliably match to the CRSP Mutual Funds database, we find that, on average, an affiliated fund invests 0.8% of its assets in an IPO, and this investment boosts its performance by 1.1% in that year. Using estimates from Del Guercio and Tkac (2002), this boost in performance translates into an incremental $0.2 million in management fees for the affiliated funds that receive allocations in an IPO (we provide details of our calculations in the Web Appendix). Using a decay factor of 66% and a discount rate of 10.8%, the present value of this increment in management fees amounts to about $0.46 million.

Turning now to the impact of kickbacks from affiliated allocations, Goldstein et al. (2011) reports "abnormal commissions of between 2.66¢ and 3.54¢ for every $1 left on the table." We believe this interval is also a reasonable estimate in our context: The evidence in our Figure 8 indicates that there is no change in the percentage of allocations to independent funds at the three-year cutoff, and our stylized model suggests that the same should be true for allocations to favored investors. To remain conservative, we use the lower value in the Goldstein et al. (2011) interval. The impact on kickbacks due to supernepotism then comes to 0.0266*11=$0.29 million.

Overall, the loss in underwriting fees due to supernepotism is $0.73 million, compared to the combined benefits to management fees and kickback revenues of $0.46 million + $0.29 million = $0.75 million. While these are rough estimates, they suggest that our estimate of the additional underpricing due to affiliated allocations is reasonable.

V. Robustness Checks

The advantage of the RDD methodology is that it offers internally valid identification. The disadvantage is that it might lack external validity, because its estimates are local to complier IPOs around the three-year cutoff. For robustness, we follow Gathergood, Guttnam-Kenney, and Hunt (2019) and complement our RDD evidence with an OLS regression using the full sample of eligible IPOs. Results are reported in Table 5, using robust standard errors for inference.

[Table 5 about here.]

Our affiliated allocation measures have a positive and statistically significant coefficient in all specifications. This positive correlation persists after controlling for issuer and issue characteristics, as well as year, industry, and underwriter fixed effects.

We performed several other robustness checks. First, we find that our RDD results are not driven by rounding down the age variable (Dong (2015)). Second, they are similar to a subsample of 33 IPOs for which we know the exact founding day (even though the statistical significance is reduced, due to the small sample size). Third, they are similar if we restrict the analysis to allocations to funds affiliated with the lead underwriters. Fourth, they hold within industries and subperiods. Fifth, they hold when using different winsorization thresholds. Sixth, they are stronger if we exclude from our sample the IPOs with uncertainty around their non-compliance with rule 10f-3. See the Web Appendix for more details.

VI. Conclusion

We identify an unexplored conflict of interest in IPOs and argue that it contributes to IPO underpricing. We hypothesize that underwriting banks may underprice IPOs to benefit their affiliated funds (the "supernepotism" hypothesis). Using rule 10f-3 of the U.S. Investment Company Act, we construct a hand-collected dataset of IPO allocations received by funds affiliated with the underwriter. To assess the causal effect of affiliated allocations on the IPO offer price, we implement a fuzzy regression discontinuity design (RDD). We exploit a regulatory threshold, set by rule 10f-3, which provides exogenous variation in the allocation decision. We find that a 1 percentage point increase in allocations to affiliated funds causes underpricing to be 5.4 percentage points higher, resulting in an additional $11 million left on the table. Our evidence suggests that supernepotism has real costs for the issuing firm.

Other conflicts of interest faced by IPO underwriters have long been documented. For example, it is well-known that underwriters allocate underpriced shares to favored investors in exchange for kickbacks in the form of trading commissions. One might expect the supernepotism conflict to mitigate, or be tempered by, these other conflicts; after all, there are limits to how much an underwriter can underprice an IPO, as well as limits to how many shares it can allocate in a self-serving manner. Our findings suggest, however, that the conflicts of interest faced by IPO underwriters may instead reinforce each other. When the underwriter can allocate shares to affiliated funds, the winner's curse faced by regular investors becomes more acute. Favored investors benefit even more from underpriced shares, generating more kickback revenues for the underwriter.

Our findings shed light on a previously unexplored tradeoff facing IPO issuers. For them, the benefits of going public must be compared with the lost IPO proceeds due to supernepotism. Our conversations with asset managers suggest that the supernepotism behavior we document, and its consequences for IPO pricing, are known to some participants in the IPO market, but it is not clear to us whether this behavior is widely known to IPO issuers. Conceivably, an IPO issuer concerned about supernepotism could turn to an underwriter who is less active in the fund management business, but we have no indication, even anecdotally, that this is the case. An intriguing possibility is that IPO issuers may view the underwriter's dumping ground incentive as an offsetting virtue to supernepotism: An issuer might accept the risk of losing proceeds due to supernepotism, if that risk comes with a guarantee that the underwriter will use its own funds to place the issuer's shares and will guarantee a successful offering when market conditions deteriorate.

Overall, the funds affiliated with banks involved in underwriting an IPO receive two benefits: (1) Underwriters underprice IPOs more when they expect their affiliated funds to receive IPO shares; and (2) underwriters allocate more underpriced shares to their affiliated funds. The first channel has not so far received attention, and points to a direct monetary cost to IPO issuers from a conflict of interest faced by banks involved in both IPO underwriting and asset management.

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Figure 1
Number of IPOs by Year.
This figure shows the number of eligible and non-eligible IPOs by year.

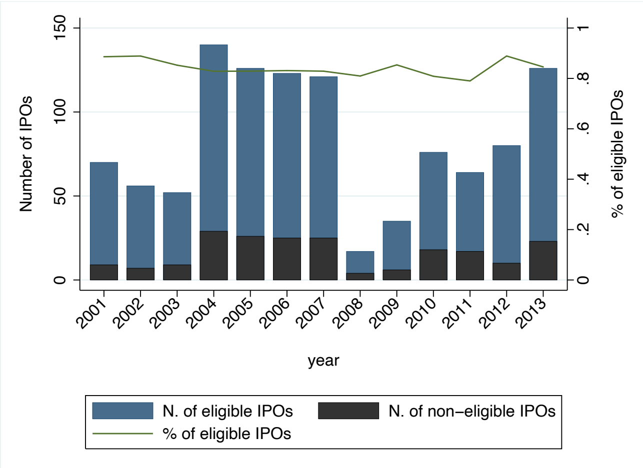
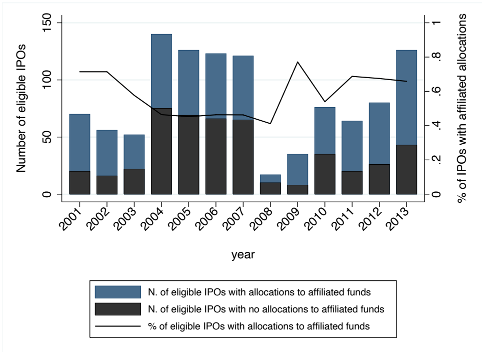
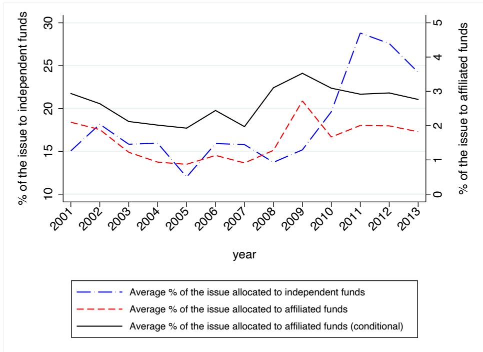


Figure 2
Institutional IPO Allocations by Year.
This figure shows the affiliated and independent allocations from 2001 to 2013 of 1,086 eligible IPOs. Panel A plots the number and the percentage of IPOs that involve at least one affiliated transaction, and the number of IPOs with no affiliated allocations. Panel B plots the average percentage of the issue allocated to affiliated funds, the average percentage of the issue allocated to independent funds, and the average percentage of the issue allocated to affiliated funds conditional on IPOs involving at least one affiliated transaction.



(A) IPOs with and without affiliated allocations.



(B) Average percentage of issue allocated.

Figure 3
Identification Strategy.
This figure visualizes an intuitive representation of our identification strategy, where P is the IPO price and α is the percentage allocation to affiliated funds.

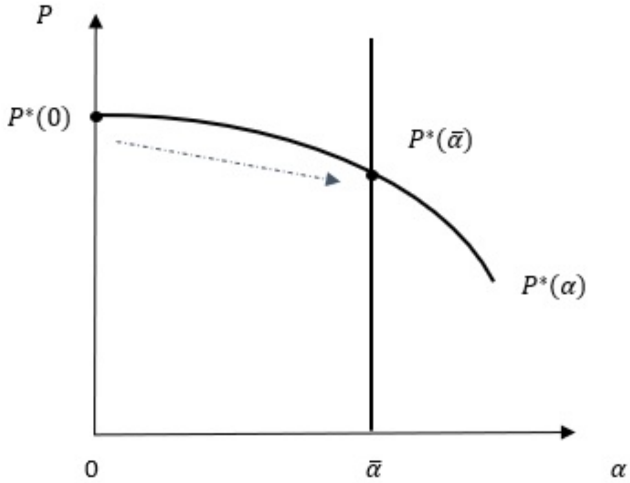
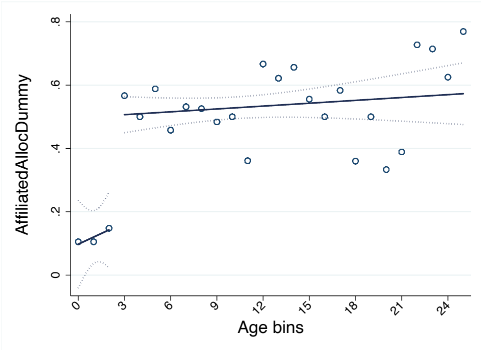
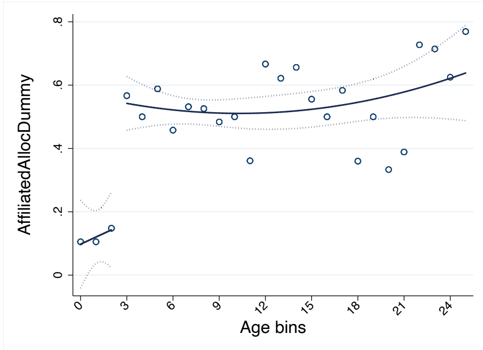


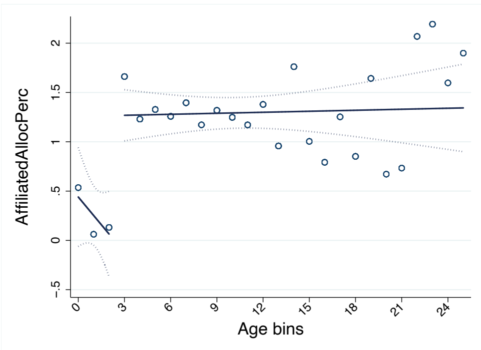
Figure 4
Affiliated Allocations by Age.
This figure plots average treatments by the forcing variable (age at IPO). We compute the average $AffiliatedAllocDummy$ (Panels A and B) and $AffiliatedAllocPerc$ (Panels C and D) for each age group (bin) of one-year size. Fitted values come from a linear fit on both sides of the three-year cutoff in Panels A and C; they come from a linear fit for $Age < 3$ and a quadratic fit for $3 \leq Age \leq 25$ in Panels B and D. 95% confidence intervals are reported with dotted lines.



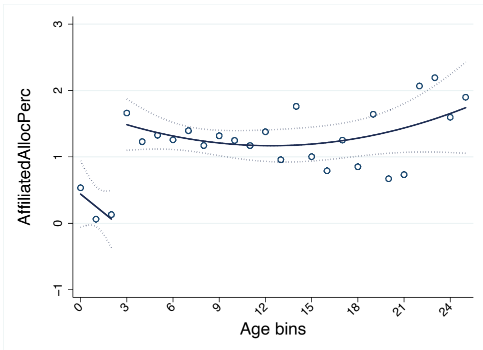
(A) Affiliated Allocations Dummy – Linear fit.



(B) Affiliated Allocations Dummy – Quadratic fit.

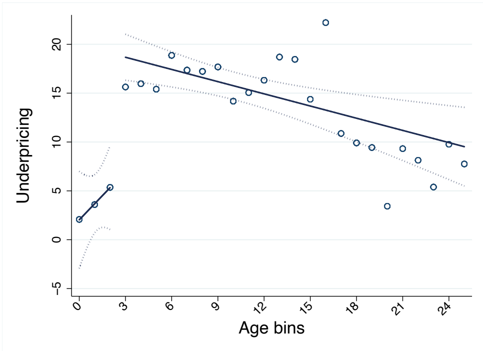


(C) Affiliated Allocations as Percentage – Linear fit.

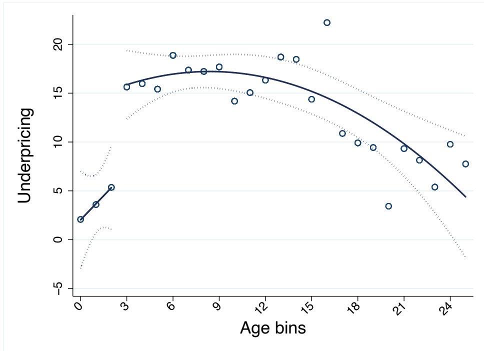


(D) Affiliated Allocations as Percentage – Quadratic fit.

Figure 5
Underpricing by Age.
This figure plots the average outcome by the forcing variable (age at IPO). We compute average $Underpricing$ for each age group (bin) of one-year size. Fitted values come from a linear fit on both sides of the three-year cutoff in Panel A; they come from a linear fit for $Age < 3$ and a quadratic fit for $3 \leq Age \leq 25$ in Panel B. 95% confidence intervals are reported with dotted lines.

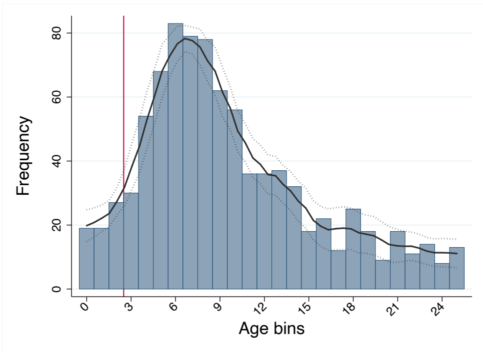


(A) Underpricing – Linear fit.

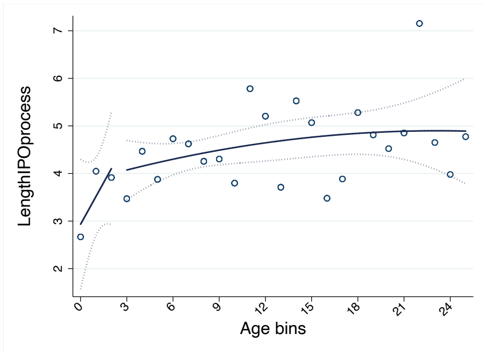


(B) Underpricing – Quadratic fit.

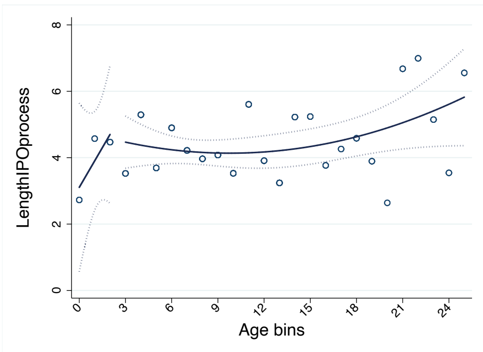
Figure 6
Density and IPO Process Length by Age.
This figure plots the number of IPOs (Panel A) and the average length of the IPO process (Panels B, C, and D) by the forcing variable. Panel A reports the histogram and its smoothed values from a kernel-weighted polynomial regression with Epanechnikov kernel. In Panel B, we compute average $LengthIPOprocess$ for each age group (bin) of one-year size. In Panels C and D, we split the average $LengthIPOprocess$ by hot and cold IPOs, respectively. Hot (cold) IPOs are defined as IPOs with a positive (non-positive) price adjustment during the IPO process ($Adjustment$). Fitted values come from a linear fit for $Age < 3$ and a quadratic fit for $3 \leq Age \leq 25$. 95% confidence intervals are reported with dotted lines.



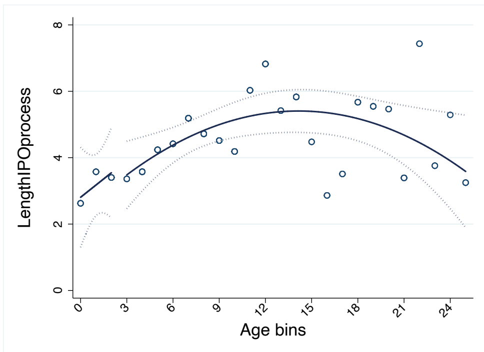
(A) IPO Frequency by Age – All IPOs.



(B) Length of the IPO Process – All IPOs.



(C) Length of the IPO Process – Hot IPOs.

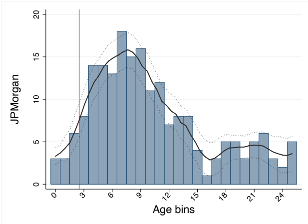


(D) Length of the IPO Process – Cold IPOs.

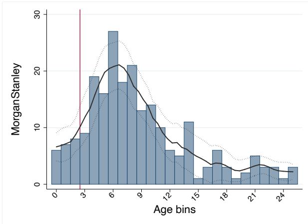
Figure 7

Density by Age for Each Underwriter.

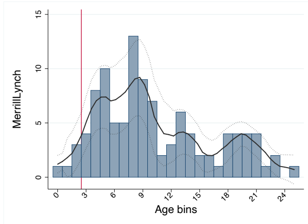
This figure plots the number of IPOs underwritten by the most important underwriters by age groups (bins) of one-year size. If an IPO has multiple underwriters, it is included in the subfigures for each of them. All subfigures report histograms and smoothed values from kernel-weighted polynomial regressions with Epanechnikov kernel. 95% confidence intervals are reported with dotted lines.



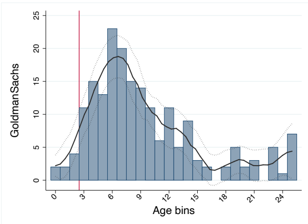
(A) JP Morgan (JPM).



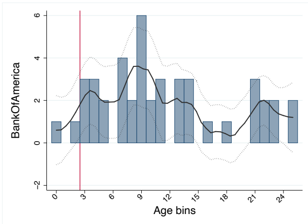
(B) Morgan Stanley & Co.



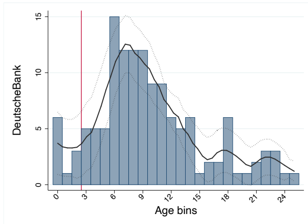
(C) Merrill Lynch & Co Inc.



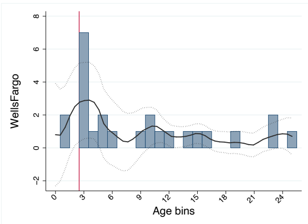
(D) Goldman Sachs & Co.



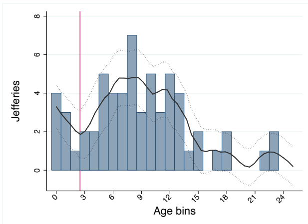
(E) Bank of America Securities LLC.



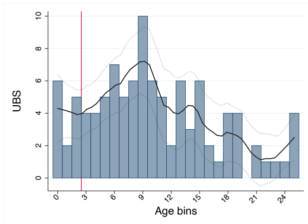
(F) Deutsche Bank Securities Corp.



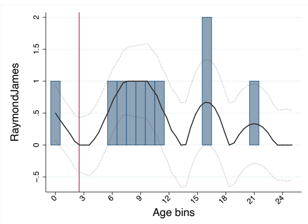
(G) Wells Fargo.



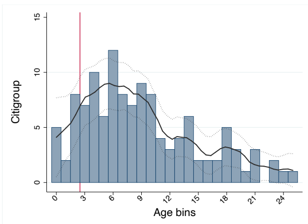
(H) Jefferies & Co Inc.



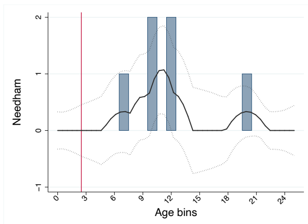
(I) UBS Investment Bank.



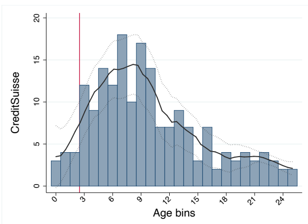
(J) Raymond James & Associates.



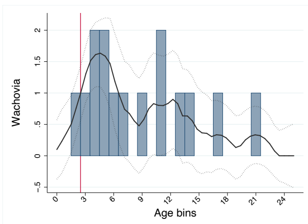
(K) Citigroup.



(L) Needham & Co Inc.

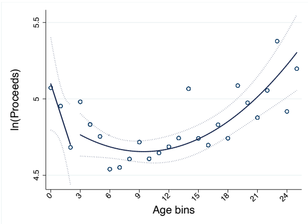


(M) Credit Suisse First Boston.

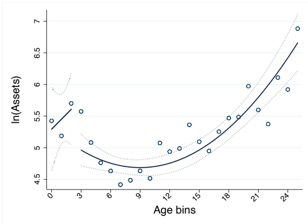


(N) Wachovia Securities Inc.

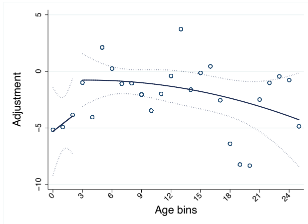
Figure 8
Covariates by Age.
This figure plots average covariates by the forcing variable (age at IPO). We compute the average value of each control variable by age groups (bins) of one-year size. Fitted values come from a linear fit for $Age < 3$ and a quadratic fit for $3 \leq Age \leq 25$. 95% confidence intervals are reported with dotted lines.



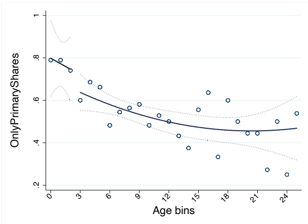
(A) Proceeds (Natural Logarithm).



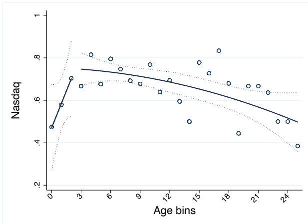
(B) Assets (Natural Logarithm).



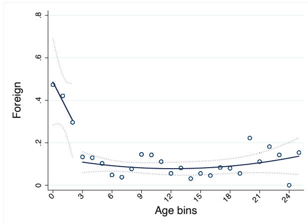
(C) Adjustment (%).



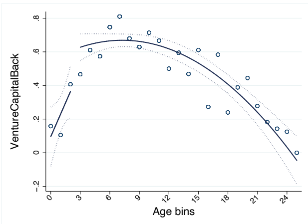
(D) Only Primary Shares Dummy.



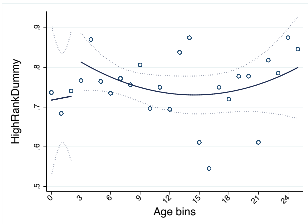
(E) Nasdaq Dummy.



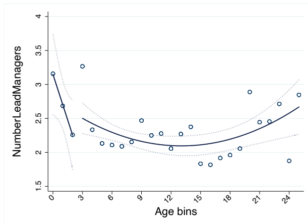
(F) Foreign Dummy.



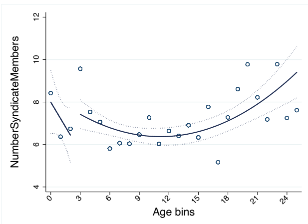
(G) Ventura Capital Backed Dummy.



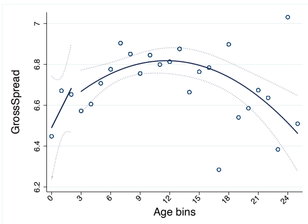
(H) High Rank Dummy.



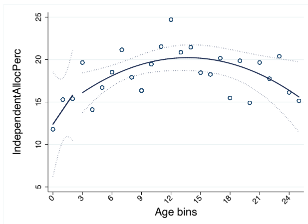
(I) Number of Lead Managers.



(J) Number of Syndicate Members.

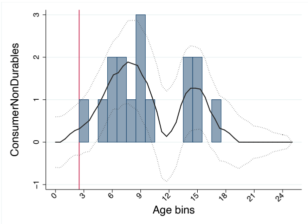


(K) Gross Spread (%).

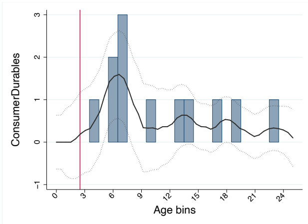


(L) Independent Allocations (%).

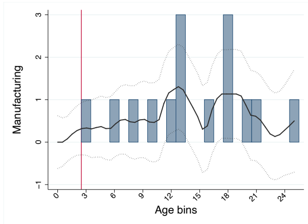
Figure 9
Density by Age for Each Industry.
This figure plots the number of IPOs by age groups (bins) of one-year size in each of the 12 Fama-French industries. All subfigures report histograms and smoothed values from kernel-weighted polynomial regressions with Epanechnikov kernel. 95% confidence intervals are reported with dotted lines.



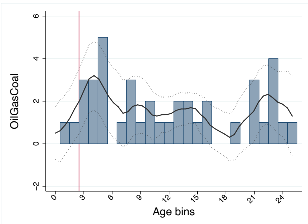
(A) Consumer NonDurables.



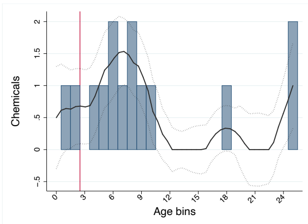
(B) Consumer Durables.



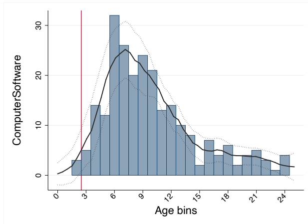
(C) Manufacturing.



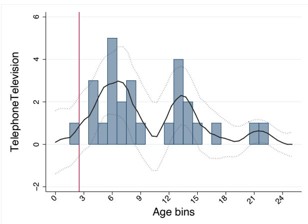
(D) Oil, Gas, and Coal.



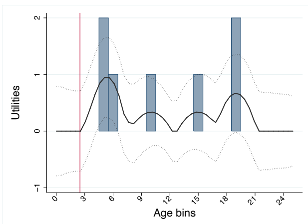
(E) Chemicals and Allied Products.



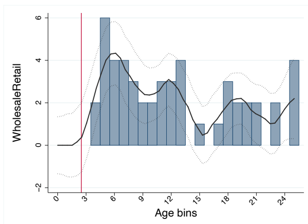
(F) Business Equipment – Computers, Software.



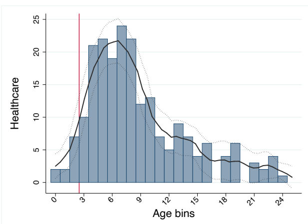
(G) Telephone and Television Transmission.



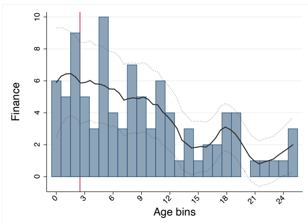
(H) Utilities.



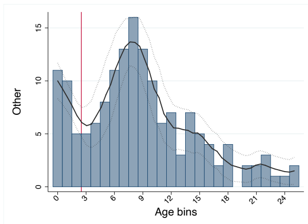
(I) Wholesale, Retail, and Some Services.



(J) Healthcare, Medical Equipment, and Drugs.

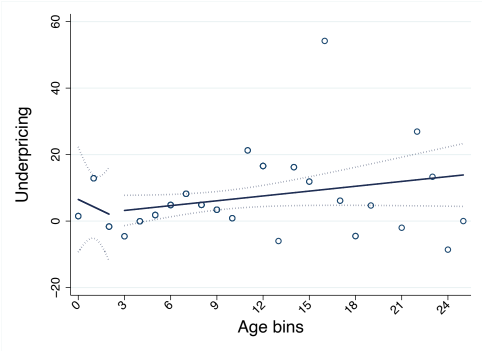


(K) Finance.

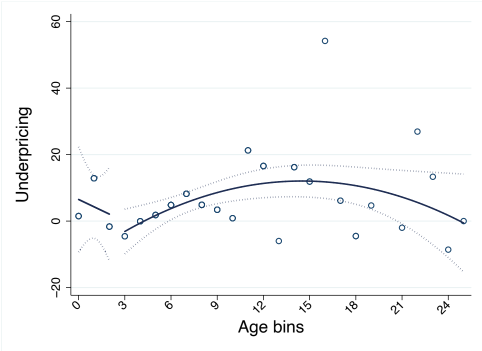


(L) Other.

Figure 10
Underpricing by Age for Non-eligible IPOs.
This figure plots the average outcome by forcing variable (age at IPO) for non-eligible IPOs. We compute average $Underpricing$ for each age group (bin) of one-year size. Fitted values come from a linear fit on both sides of the three-year cutoff in Panel A; they come from a linear fit for $Age < 3$ and a quadratic fit for $3 \leq Age \leq 25$ in Panel B. 95% confidence intervals are reported with dotted lines.



(A) Underpricing for Non-Eligible IPOs – Linear fit.

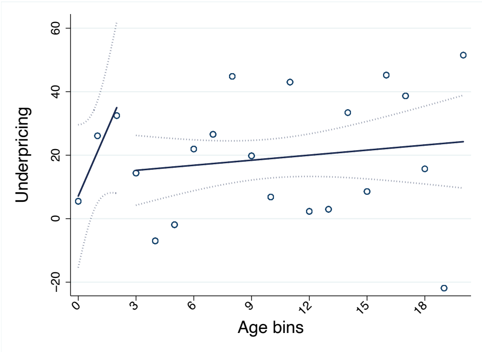


(B) Underpricing for Non-Eligible IPOs – Quadratic fit.

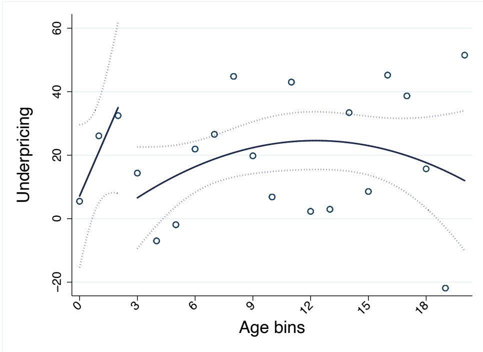
Figure 11

Underpricing by Age for European IPOs.

This figure plots the average outcome by forcing variable (age at IPO) for a sample of 456 European firm-commitment IPOs performed in the period 2001-2013. We compute average $Underpricing$ for each age group (bin) of one-year size. Fitted values come from a linear fit on both sides of the three-year cutoff in Panel A; they come from a linear fit for $Age < 3$ and a quadratic fit for $3 \leq Age \leq 25$ in Panel B. 95% confidence intervals are reported with dotted lines.

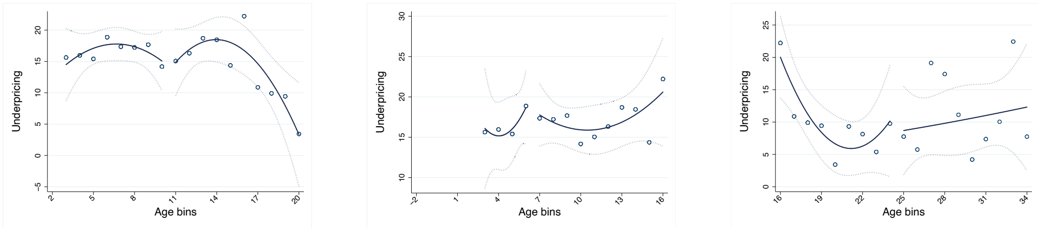


(A) Underpricing in Europe – Linear fit.



(B) Underpricing in Europe – Quadratic fit.

Figure 12
Underpricing by Age with Arbitrary Thresholds.
This figure plots the average outcome by forcing variable (age at IPO) for arbitrary thresholds. In Panel A, the arbitrary threshold is the median value of the forcing variable, conditional on the forcing variable being higher than the cutoff. In Panel B, the arbitrary threshold is the 25th percentile of the forcing variable, conditional on the forcing variable being higher than the cutoff. In Panel C, the arbitrary threshold is the 75th percentile of the forcing variable, conditional on the forcing variable being higher than the cutoff. Fitted values come from a quadratic fit on both sides of the arbitrary cutoff. 95% confidence intervals are reported with dotted lines.



(A) 50% Percentile Threshold. **(B)** 25% Percentile Threshold. **(C)** 75% Percentile Threshold.

Table 1
List of Variables.
This table lists and defines all the variables used in this paper.

Variable	Description
IPO VARIABLES	
Underpricing (%)	(first day closing price - offer price)*100/offer price
Age (years)	age of the issuer in years, computed as: issue year - founding year
Proceeds ($ million)	total proceeds from the issue, in millions of dollars
Assets ($ million)	total assets before the IPO, in millions of dollars
Adjustment (%)	(offer price - midpoint)*100/midpoint, where "midpoint" is the original midpoint of the filing range
OnlyPrimaryShares	dummy variable equal to one if all the shares issued are primary shares
Nasdaq	dummy variable equal to one if the IPO is listed on the NASDAQ
Foreign	dummy variable equal to one if the issuer is located outside the United States
VentureCapitalBack	dummy variable equal to one if the IPO is backed by a venture capitalist
LengthIPOprocess (months)	length of the IPO process in months, computed as: (issue date - filing date)/30.4375
HighRankDummy	dummy variable equal to one if at least one underwriter has a Ritter ranking equal to 9
NumberLeadManagers	number of bookrunners and lead managers in the syndicate
NumberSyndicateMembers	total number of syndicate members
GrossSpread (%)	gross underwriters' spread
FirmCommitment	dummy variable equal to one if the securities are issued under a firm-commitment contract
ALLOCATION VARIABLES	
AffiliatedAllocPerc (%)	percentage of the issue allocated to affiliated funds
AffiliatedAllocDummy	dummy variable equal to one if affiliated funds receive shares in the IPO
IndependentAllocPerc (%)	percentage of the issue held by s12 funds at the first reporting date after the IPO minus AffiliatedAllocPerc

Table 2
Summary Statistics of IPO and Allocation Data.
This table provides summary statistics at the issuer level for 1,086 eligible IPOs (Columns 2-4), 208 non-eligible IPOs (Columns 5-7), and 217 IPOs used in our main RDD analyses (Columns 8-10). We define an IPO as "eligible" if it satisfies these conditions: The issuer is at least 3 years old, the securities are issued under a firm-commitment contract, there is more than one underwriter in the syndicate, and at least one lead underwriter has been involved in a 10f-3 transaction in our sample. The RDD sample comprises 152 eligible IPOs with $3 \leq Age < 6$ years and 65 IPOs that satisfy all the other eligibility requirements but are less than 3 years old. Panel A summarizes the IPO characteristics, and Panel B summarizes the allocation data. For each variable, the table reports its average (mean), its median (p50), and its standard deviation (sd). IPO and allocation variables are defined in Table 1.

(A) IPO Characteristics

	Eligible			Non-eligible			RDD sample		
	mean	p50	sd	mean	p50	sd	mean	p50	sd
Underpricing (%)	14.2	9.09	19.4	5.13	1.16	13.9	12.1	5.00	19.4
Age (years)	22.9	11	27.7	11.1	5	22.5	3.3	4	1.6
Proceeds ($ million)	219	117	266	86.7	48.2	112	196	108	227
Assets ($ billion)	1351	218	2373	1123	51.3	2455	1354	190	2446
Adjustment (%)	-1.59	0	13.3	-4.49	0	11.2	-1.84	0	12.6
GrossSpread (%)	6.63	7	0.73	6.93	7	0.66	6.63	7	0.70
NumberLeadManagers	2.38	2	1.47	1.69	1	1.13	2.49	2	1.67
NumberSyndicateMembers	7.51	6	4.59	4.80	4	3.34	7.54	6	4.20
LengthIPOprocess (months)	4.41	3.37	3.57	4.39	3.60	3.39	3.88	3.19	3.14
OnlyPrimaryShares	0.52	1	0.50	0.79	1	0.41	0.69	1	0.46
Nasdaq	0.61	1	0.49	0.75	1	0.43	0.69	1	0.46
Foreign	0.097	0	0.30	0.21	0	0.41	0.20	0	0.40
VentureCapitalBack	0.45	0	0.50	0.31	0	0.46	0.47	0	0.50
HighRankDummy	0.78	1	0.41	0.25	0	0.44	0.78	1	0.42

(B) Allocation Data

	Eligible			Non-eligible			RDD sample		
	mean	p50	sd	mean	p50	sd	mean	p50	sd
AffiliatedAllocPerc (%)	1.44	0.12	2.36	0.077	0	0.68	1.02	0	2.06
AffiliatedAllocDummy	0.56	1	0.5	0.082	0	0.27	0.42	0	0.5
IndependentAllocPerc (%)	18.3	16.1	13.3	10.1	5.73	12.0	15.8	13.2	13.4

Table 3
The Effect of Affiliated Allocations on Underpricing - Fuzzy RDD Estimates.
This table contains the second stage coefficients of a local 2SLS regression of $Underpricing$ on two measures of affiliated allocations instrumented by z, for different values of the bandwidth h. The two measures are $AffiliatedAllocPerc$ (Panel A) and $AffiliatedAllocDummy$ (Panel B). z is a dummy variable equal to one if $Age \geq 3$, and zero otherwise; $x = Age - 3$; and $z\_x = z \cdot x$. Relevant statistics from the first stage regression (F, coefficient of z, t-stat of z, and R^2) are also reported. Returns and fractions are expressed as percentages. All non-dummy variables except Age are winsorized at the 2.5% level. Heteroschedasticity-robust t-statistics are in parentheses. Significance levels are denoted as: * 0.1, ** 0.05, *** 0.01.

(A) Affiliated Allocations as Percentage ($AffiliatedAllocPerc$)

	1	2	3	4	5	6
	h=1	h=2	h=2	h=3	h=3	h=3
AffiliatedAllocPerc	6.72**	8.76***	5.28	10.4***	6.55*	5.43*
	(2.22)	(3.12)	(1.29)	(3.59)	(1.74)	(1.90)
x			2.17		1.40	2.67*
			(0.79)		(1.02)	(1.67)
z_x						-2.16
						(-0.70)
Constant	4.47***	3.73*	7.15*	1.49	5.01	7.64***
	(2.67)	(1.90)	(1.76)	(0.58)	(1.48)	(2.67)
F (2nd stage)	4.93	9.76	6.47	12.9	9.76	7.23
F (1st stage)	10.0	24.6	12.2	23.0	12.8	14.4
Coefficient of z (1st stage)	1.53	1.28	1.79	1.13	1.59	1.64
t-stat of z (1st stage)	3.16	4.96	2.18	4.79	2.68	3.30
R^2 (1st stage)	0.14	0.097	0.10	0.064	0.067	0.067
Observations	57	130	130	217	217	217

(B) Affiliated Allocations Dummy ($AffiliatedAllocDummy$)

	1	2	3	4	5	6
	h=1	h=2	h=2	h=3	h=3	h=3
AffiliatedAllocDummy	24.6**	28.5***	21.1	27.4***	29.0**	24.8**
	(2.66)	(3.62)	(1.47)	(5.12)	(2.00)	(2.17)
x			1.42		-0.22	1.09
			(0.48)		(-0.12)	(0.68)
z_x						-1.83
						(-0.73)
Constant	1.72	0.91	3.88	0.51	-0.097	2.87
	(0.74)	(0.33)	(0.69)	(0.24)	(-0.02)	(0.69)
F (2nd stage)	7.05	13.1	7.82	26.3	12.7	9.11
F (1st stage)	13.1	28.0	13.9	55.6	28.2	18.9
Coefficient of z (1st stage)	0.42	0.39	0.45	0.43	0.36	0.36
t-stat of z (1st stage)	3.63	5.29	2.41	7.46	2.62	2.71
R^2 (1st stage)	0.19	0.15	0.15	0.16	0.16	0.16
Observations	57	130	130	217	217	217

Table 4
Reduced-form Regression.
This table contains coefficients of the reduced-form regression of $Underpricing$ on z, x, and z_x, for different values of the bandwidth h. z is a dummy variable equal to one if $Age \geq 3$, and zero otherwise; $x = Age - 3$; and $z\_x = z \cdot x$. Returns and fractions are expressed as percentages. All non-dummy variables except Age are winsorized at the 2.5% level. Heteroschedasticity-robust t-statistics are in parentheses. Significance levels are denoted as: * 0.1, ** 0.05, *** 0.01.

	1	2	3	4	5	6
	h=1	h=2	h=2	h=3	h=3	h=3
z	10.3***	11.2***	9.45	11.8***	10.4**	8.90**
	(2.79)	(3.78)	(1.49)	(5.24)	(2.14)	(2.17)
x			0.86		0.44	1.65
			(0.27)		(0.30)	(1.20)
z_x						-1.83
						(-0.74)
Constant	5.36***	4.63**	5.84	3.88***	4.70	6.97**
	(3.08)	(2.46)	(1.31)	(2.64)	(1.55)	(2.46)
F	7.77	14.3	7.61	27.5	13.7	9.43
R^2	0.12	0.078	0.079	0.078	0.078	0.079
Observations	57	130	130	217	217	217

Table 5
OLS Regression of Underpricing on Affiliated Allocations.
This table contains the coefficient estimates from several specifications of an OLS regression of $Underpricing$ on two measures of affiliated allocations: a dummy variable that identifies IPOs with affiliated allocations (columns 1-5) and the percentage of the issue allocated to affiliated funds (columns 6-10). The sample includes 1086 eligible IPOs in the period 2001-2013. Columns 2, 3, 7 and 8 introduce IPO level control variables, as defined in Table 1. Columns 4 and 9 introduce year and industry fixed effects. Industry fixed effects are based on the Fama-French 12-industries classification. Columns 5 and 10 introduce lead underwriters' control variables. Returns and fractions are expressed as percentages. All non-dummy variables except Age are winsorized at the 2.5% level. Heteroschedasticity-robust t-statistics are in parentheses. Significance levels are denoted as: * 0.1, ** 0.05, *** 0.01.

	1	2	3	4	5	6	7	8	9	10
AffiliatedAllocDummy	11.0***	6.94***	6.54***	6.28***	6.50***					
	(10.30)	(6.11)	(5.45)	(5.15)	(5.15)					
AffiliatedAllocPerc						0.99***	0.81***	0.70***	0.62**	0.67**
						(3.48)	(3.31)	(2.80)	(2.44)	(2.52)
IndependentAllocPerc	0.30***	0.21***	0.19***	0.18***	0.17***	0.34***	0.23***	0.21***	0.19***	0.17***
	(6.50)	(5.18)	(4.71)	(4.44)	(3.93)	(7.21)	(5.55)	(4.98)	(4.59)	(4.03)
ln(Age+1)		-1.64***	-1.13*	-1.70***	-1.60**		-1.65***	-1.08*	-1.61**	-1.48**
		(-2.86)	(-1.91)	(-2.64)	(-2.44)		(-2.88)	(-1.83)	(-2.51)	(-2.25)
ln(Assets)		-1.55***	-0.68	-0.94	-0.90		-1.45***	-0.78	-1.06	-1.07
		(-3.91)	(-1.10)	(-1.43)	(-1.30)		(-3.54)	(-1.26)	(-1.60)	(-1.54)
Adjustment		0.63***	0.62***	0.57***	0.56***		0.70***	0.67***	0.63***	0.61***
		(15.91)	(14.12)	(12.70)	(11.92)		(18.46)	(15.95)	(14.38)	(13.60)
OnlyPrimaryShares		-0.91	-1.23	-0.32	-0.33		-1.59	-1.76*	-0.79	-0.80
		(-0.93)	(-1.26)	(-0.31)	(-0.31)		(-1.62)	(-1.80)	(-0.78)	(-0.75)
Nasdaq		1.43	1.17	1.85	2.05		0.38	0.43	1.21	1.39
		(1.09)	(0.89)	(1.42)	(1.51)		(0.30)	(0.33)	(0.94)	(1.04)
Foreign		0.88	0.17	-0.080	-0.034		1.07	0.29	-0.0047	0.11
		(0.54)	(0.11)	(-0.05)	(-0.02)		(0.64)	(0.17)	(-0.00)	(0.06)
ln(Proceeds)			-0.33	0.45	0.27			0.28	1.15	0.91
			(-0.23)	(0.31)	(0.17)			(0.20)	(0.79)	(0.58)
VentureCapitalBack			3.52**	4.98***	5.19***			3.49**	4.98***	5.20***
			(2.49)	(3.48)	(3.44)			(2.47)	(3.49)	(3.45)
LengthIPOprocess			-0.39***	-0.28**	-0.29**			-0.38***	-0.27**	-0.28**
			(-3.09)	(-2.19)	(-2.21)			(-2.96)	(-2.09)	(-2.10)
HighRankDummy			0.87	1.11	2.01			2.01	2.29*	2.89*
			(0.66)	(0.82)	(1.17)			(1.51)	(1.68)	(1.68)
NumberLeadManagers			0.40	-0.34	1.89			0.38	-0.33	1.48
			(1.02)	(-0.73)	(1.26)			(0.95)	(-0.71)	(0.98)
NumberSyndicateMembers			-0.028	0.12	0.10			0.0067	0.12	0.11
			(-0.22)	(0.77)	(0.63)			(0.05)	(0.75)	(0.66)
GrossSpread			1.65*	1.74*	1.61			2.17**	2.20**	2.08*
			(1.71)	(1.77)	(1.43)			(2.27)	(2.26)	(1.89)
Constant	2.63***	19.8***	3.97	8.67	9.33	6.66***	22.8***	0.057	5.26	6.49
	(2.81)	(6.36)	(0.38)	(0.78)	(0.73)	(6.67)	(7.27)	(0.01)	(0.48)	(0.52)
industry FE	No	No	No	Yes	Yes	No	No	No	Yes	Yes
year FE	No	No	No	Yes	Yes	No	No	No	Yes	Yes
underwriter FE	No	No	No	No	Yes	No	No	No	No	Yes
R^2	0.131	0.342	0.354	0.393	0.408	0.067	0.328	0.343	0.383	0.397
F	86.7	64.8	36.4	16.7	9.99	32.4	60.9	34.4	15.9	9.47
Observations	1086	1086	1086	1086	1086	1086	1086	1086	1086	1086

A. Downloading and Parsing N-SAR Filings

The 77o item of the N-SAR filing asks if the filer was involved in any affiliated transactions pursuant to rule 10f-3. If the answer is yes, then the filer has to provide an attachment containing additional information about each transaction. We download from the SEC EDGAR database the 104,207 N-SAR forms filed from January 2001 to December 2014. Because an N-SAR form filed in year X can contain information about year X-1, this time span covers the affiliated transactions executed in the period 2001 to 2013. Institutions were instructed to name their attachments: "EX-99.77O 10f-3 RULE." However, since a non-negligible number of attachments were filed with a wrong or incomplete name, we do not rely only on that tag to find the attachments we are interested in. We focus on the N-SAR filings that satisfy at least one of the following (case insensitive) criteria:

- contain in the main form or in any attachment the string "077 O000000 Y";
- contain in the main form or in any attachment the string "10f";
- contain in the main form or in any attachment the string "77o."

Under these criteria, we keep many false positives that do not contain a 10f-3 attachment. Our objective is to minimize false negatives, so as to lose the least possible information.[21] These criteria leave us with 10,622 N-SAR filings. We parse them manually, because the reporting format differs considerably, both between and within investment companies. Figure A1 provides an example of a 10f-3 attachment to an N-SAR filing.

[Figure A1 about here.]

Although 10f-3 attachments report information about both equity and bond issues, we

[21] False negatives are N-SAR filings that contain a 10f-3 attachment, but: i) mistakenly answer "NO" to the 77o item, and ii) do not contain the terms "10f" or "77o" in the entire N-SAR document and its attachments.

hand-collect information about equity issues only. Sometimes the N-SAR filings explicitly distinguish between the two categories; most of the time, however, we have to infer the kind of security issued. For bond issues, the filings often report the maturity date or the yield to maturity; the name of the fund receiving an allocation often reveals whether it is a bond/municipal fund or an equity fund; and the reported offer price is typically close to 100 for bond issues, etc. When no such information is provided, and we are unable to distinguish equity from bond issues, we include the observation in our dataset to minimize false negatives.[22] In this way, we collect 18,872 observations at the issue-"investor"-broker level, meaning that we observe the number of shares allocated to investor f in IPO i by broker b. The "investor" can be a fund, a subportfolio of a fund, or an investment management company.

We match 10f-3 issuers to SDC issuers mainly through issuer names and issue dates. We complement the match with other information (such as the offer price and the number of shares issued) to increase its accuracy. Moreover, we match 10f-3 underwriters to SDC underwriters by name, taking into account name changes, mergers, and acquisitions. Matching with SDC allows us to disentangle IPOs and SEOs and to focus on IPOs that satisfy the usual filters applied in the literature. This action leaves us with 8,828 IPO-investor-broker observations.

We next identify and exclude duplicates, that is, when distinct N-SAR forms report the same information about fund f receiving n shares in IPO i from broker b. Duplicates arise, for example, when an investment company reports the same information in both its annual and semi-annual N-SAR filings (in both NSAR-B and NSAR-A).

Some 10f-3 attachments contain missing values. Notably, the amount of shares allocated

[22] False positives are lost when we match our 10f-3 data with the SDC database, and so do not constitute a problem.

to affiliated funds is missing for about 5% of the observations, before any data cleaning. We use information from other filings to fill in some of these missing values. For example, if the individual number of shares n of IPO i allocated to the fund f affiliated with underwriter j is missing in one filing, but we observe the total number of shares W allocated to the adviser of fund f and other filings report the individual number of shares m received by other funds with the same adviser, then we can find out n as: $n = W - m$. In this way, we reduce the percentage of observations with missing allocations to about 1.5%. Due to these missing allocations, we slightly underestimate the total percentage of shares allocated to affiliated funds at the IPO level ($AffiliatedAllocPerc$). The allocation dummy ($AffiliatedAllocDummy$), however, is not affected.

Figure A1
Example of a 10f-3 Attachment to the N-SAR Form.

FORM 10f-3
Registered Domestic Securities and Government Securities

FUND: The UBS Funds - UBS U.S. Small Cap Growth Fund
Name of Adviser or Sub-Adviser: UBS Global Asset Management (Americas) Inc.
1. Issuer: Green Dot Corp. - Class A
2. Date of Purchase: 7/21/2010 3. Date offering commenced: 7/21/2010
4. Underwriter(s) from whom purchased: JP Morgan Chase Fleming
5. "Affiliated Underwriter" managing or participating in syndicate:
UBS Investment Bank
6. Aggregate principal amount or number of shares purchased: 20,000 shares (firmwide)
7. Aggregate principal amount or total number of shares of offering: 4,560,000 shares
8. Purchase price per unit or share(net of fees and expenses): $36.00
9. Initial public offering price per unit or share: $36.00
10. Commission, spread or profit: ____________% $_1.512_________
11. Have the following conditions been satisfied?

FUND: THE UBS Funds - UBS High Yield Fund
Name of Adviser or Sub-Adviser: UBS Global Asset Management (Americas) Inc.
1. Issuer: Pride International Inc. 6 7/8% due 8/15/2020
2. Date of Purchase: 8/03/2010 3. Date offering commenced: 8/03/2010
4. Underwriter(s) from whom purchased: Goldman Sachs & Co.
5. "Affiliated Underwriter" managing or participating in syndicate:
UBS Investment Bank
6. Aggregate principal amount or number of shares purchased: $500, 000 firmwide
7. Aggregate principal amount or total number of shares of offering: $900,000,000
8. Purchase price (net of fees and expenses): $100.00
9. Initial public offering price: $100.00
10. Commission, spread or profit: .735% $____________
11. Have the following conditions been satisfied?

Web Appendix

Nepotism in IPOs: consequences for issuers and investors

François Degeorge* and Giuseppe Pratobevera†

Abstract

This is the Web Appendix of the paper "Nepotism in IPOs: consequences for issuers and investors" (henceforth, "the paper"). We provide further material related to the paper, including:

(i) additional summary statistics and comparisons with Ritter and Zhang (2007);
(ii) detailed calculations to assess how realistic our RDD estimates are;
(iii) several robustness checks of the RDD estimates;
(iv) further discussion and robustness tests of the OLS regression;
(v) details and proofs of the model sketched in section 2 of the paper.

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1 Additional descriptive statistics

We provide additional descriptive statistics of our affiliated allocations sample. All variables are defined in Table 1 of the paper.

1.1 List of underwriters that allocate shares to their affiliated funds

In our dataset, we preserve the names of the underwriters affiliated with the funds that receive allocations. We count 64 underwriters involved in at least one 10(f)-3 transaction in our sample. In the average IPO, there are 5.3 syndicate members - 2.2 of whom are lead managers - who could be involved in an affiliated transaction. On average, 1.2 of them allocate some shares to their affiliated funds. Table W1 lists the names of the 14 underwriters that are most active in the affiliated allocations market.[1] The table reports the number of eligible IPOs underwritten by each underwriter and the number and percentage of IPOs in which each underwriter allocates some shares to its affiliated funds. JP Morgan stands out, with 230 IPOs allocated to its affiliated funds, about 60% of the eligible IPOs that it underwrites. Morgan Stanley and Merrill Lynch follow, with about half the number of IPOs allocated to their affiliated funds. Some banks, however, do not often allocate IPO shares to their affiliated funds. For example, Credit Suisse allocated only 32 IPOs out of 352 to its affiliated funds.

[Table W1 about here.]

1.2 Do IPOs allocated to affiliated funds differ from other IPOs?

Table W2 reports difference-of-means (Panel A) and difference-of-proportions (Panel B) tests to assess whether IPOs with a positive allocation to affiliated funds differ from those with no allocations to affiliated funds. The table shows that the two groups of IPOs do differ significantly, both economically and statistically. Noticeably, affiliated funds are more likely to receive allocations when the issue is more underpriced: the first day return is about 11.8 percentage points higher when funds affiliated with the underwriters receive some allocation, consistent with nepotism behavior. This pattern is confirmed by the main predictor of underpricing, which is the percentage adjustment from the midpoint of the filing range to the offer price (Hanley (1993)). On average,

[1] These 14 most active affiliated underwriters are involved in 10(f)-3 transactions in at least 25 IPOs.

IPOs allocated to affiliated funds are priced 3.1 percentage points above the midpoint of the filing range, while IPOs with no allocations to affiliated funds are priced about 7.6 percentage points below the midpoint of the filing range. The two groups differ by approximately 10.7 percentage points.

As concerns the characteristics of the issuer, affiliated funds are more likely to receive shares of older and larger firms: IPOs with affiliated allocations are approximately seven years older than, and almost two times as large as, other IPOs. Hence, affiliated funds are more likely to receive shares when the information asymmetry of the issuer is lower. This finding is broadly consistent with bookbuilding theories, as underwriters might allocate more shares to independent funds that reveal their signals when information asymmetry is high, thus penalizing their affiliated funds.[2]

As concerns the characteristics of the issue itself, affiliated funds are more likely to receive shares when the size of the issue is larger, when the number of syndicate members and lead managers is greater, and when at least one underwriter's reputation is ranked highly. On the other hand, the gross spread, the percentage of IPOs listed on NASDAQ, the percentage of IPOs issuing only primary shares, and the percentage of issuers backed by venture capitalists are all significantly lower for IPOs allocated to affiliated funds. The positive relation between affiliated allocations and the number of lead managers and syndicate members is not surprising. The larger the syndicate, the more likely it is that more than one member has affiliated funds to which to allocate shares. It is also more likely that the shares can be allocated pursuant to rule 10(f)-3, as they must be allocated through an underwriter other than the affiliated one.

Finally, the percentage of shares received by independent funds is greater by about 2.5 percentage points when the issue is allocated to affiliated funds.

[Table W2 about here.]

In subsection 2.2 of the paper we find that the percentage of IPOs allocated to affiliated funds varies by year. Moreover, in subsection 1.1. of this Web Appendix we find that the affiliated allocation business is dominated by certain underwriters. It is interesting to investigate whether the practice of favoring affiliated funds with the allocation of underpriced shares, observed for the

[2]Broadly consistent with this argument, we notice that the correlation between the fraction of shares received by independent funds, *IndependentAllocPerc*, and the size of the firm before the issue is -0.1 (untabulated). The correlation between *IndependentAllocPerc* and the age of the firm is -0.06 (untabulated).

whole sample, is driven by some subperiods or by a few underwriters. Table W3 shows that this is not the case: the tendency to allocate more underpriced shares to affiliated funds holds in every sub-period (Panel A), and for every underwriter (Panel B), though with some variation in the magnitude and statistical significance of the difference.

In Panel (A), we see that affiliated funds were favored the most in 2007: the IPOs in which they received allocations were more underpriced than other IPOs by almost 20 percentage points. The smallest difference in underpricing between IPOs with affiliated allocations ("Allocated" column) and those without affiliated allocations ("Not allocated" column) occurred in 2001, when it was about 6 percentage points and statistically insignificant. For comparison with Ritter and Zhang (2007), it is worth noting that they find the opposite result for 2001: in their sample, underpricing of IPOs allocated to affiliated funds is smaller than it is for other IPOs. This suggests that using the Spectrum 1&2 to proxy for affiliated allocations might not only influence their average size, as pointed out in subsection 2.2 of the paper, but also their variation and correlation with other variables. Panel (B) shows that each of the 14 main underwriters is prone to favoritism. The underwriter that seems to favor its affiliated funds the most is Merrill Lynch: when it allocates shares to its affiliated funds, underpricing is 18 percentage points higher. For Citigroup, by comparison, the difference between IPOs allocated to affiliated investors and other IPOs is only 1 percentage point and statistically insignificant.

[Table W3 about here.]

1.3 Detailed summary statistics for the RDD sample

Table W4 reports summary statistics for the RDD sample, split between 152 eligible IPOs with $3 \leq Age < 6$ (Columns (2)-(4)) and 65 non-eligible IPOs with $Age < 3$ (Columns (5)-(7)). Panel (A) summarizes IPO characteristics and Panel (B) summarizes allocation data. On average, IPOs above the cutoff differ from IPOs below the cutoff along several dimensions (e.g., proceeds and total assets). These average differences do not undermine the internal validity of our RDD methodology, which only needs continuity of these covariates at the three-year cutoff (see Figure 8 in the paper). However, they suggest that it may be important to control for Age in our RDD regressions.

[Table W4 about here.]

2 Reality check of the RDD estimates: detailed calculations

We provide detailed calculations of the incremental present value of management fees due to supernepotism, which support our argument in favor of the realism of our RDD estimates. (See section 4.4 of the paper.)

The banks benefit thanks to the boost in performance to their affiliated funds from the underpriced IPO shares, which translates into larger fund flows and management fees. In order to estimate these benefits, we match the funds in our sample to the CRSP Mutual Funds database by name. We can reliably match 134 funds that receive allocations in 115 IPOs, for a total of 366 fund-IPO observations. This corresponds to approximately 7% of the funds and 5% of the fund-IPO observations in our dataset. From the CRSP Mutual Funds database we get funds' monthly returns, Total Net Assets (TNA), and % management fees. The average affiliated fund invests 0.8% of its TNA in an IPO and has an annualized return of 10.8% from the beginning of the year to the reporting date prior to the IPO.

To assess the contribution of IPO underpricing to total fund returns, we make two simplifying assumptions. First, we assume that IPO underpricing is fully realized by affiliated funds during the first month after the issue. This is a reasonable assumption because Chemmanur et al. (2010) find that institutional investors tend to fully realize IPO underpricing and most of their trading activity in the IPO happen during the first month after the issue. Second, we assume that funds' past returns are the expected returns that the funds' get on the money invested in stocks other than the IPO. This assumption is reasonable for our purposes, since the information about past returns is available to investment bankers when they make their IPO allocation and pricing decisions. Under these assumptions, we can estimate the expected monthly return for the affiliated funds that invest in an IPO as $r_{i,f} = q_{i,f}u_i + (1 - q_{i,f})\hat{r}_{i,f}$, where $q_{i,f}$ is the percentage of TNA invested by fund f in IPO i, u_i is the underpricing of IPO i, and $\hat{r}_{i,f}$ is the past monthly return of fund f prior to IPO i. By averaging $r_{i,f}$, we find an average annualized return of 11.9%. Hence, IPO underpricing boosts fund returns by 1.1% on a yearly basis.[3]

To assess the impact of a 1.1% increase in returns on fund flows, we use Del Guercio and

[3] In unreported analyses, we assume that the expected return is the return over the same month of the IPO, excluding underpricing. We get a yearly boost of about 1.1% even with this alternative measure.

Tkac (2002). Del Guercio and Tkac (2002)'s Table 2, Column 3, reports that a one percentage point increase in fund returns increases flows by 3.5 million in the first year. This implies a dollar flow increase of 3.8 million because of IPO underpricing (1.1×3.5) for a given fund. About 7.5 affiliated funds receive allocations in the average IPO in our sample. Hence, the flow of funds at the IPO level is \$28.5 million (3.8×7.5). Moreover, affiliated funds have a larger TNA at the end of the month because of a greater return due to investing in an IPO instead of other stocks. We can compute the average increase in TNA to be \$0.37 million at the fund level and \$2.78 million (0.37×7.5) at the IPO level. Since the average management fee in our sample is 0.63%, the performance boost translates into an incremental \$0.2 million in management fees for all the affiliated funds that receive allocations in a given IPO during the first year ($0.0063 \times (2.78 + 28.5)$).

Using Del Guercio and Tkac (2002), Table 5 (Panel B), we infer a decay factor of 66% for the effect of fund returns on fund flows and, thus, management fees. Using a discount rate of 10.8%, we estimate the present value of management fees as:

$$PV(fees) = \frac{\$0.2m}{1.108} + \frac{\$0.2m \times 0.66}{1.108^2} + \frac{\$0.2m \times 0.66^2}{1.108^3} + \ldots = \$0.46m$$

We estimate the 10.8% discount rate as follows. First, for each fund we estimate loadings on the Fama-French three factors, which we get from Kenneth French's website. To compute the discount factor for each fund, we multiply the estimated loadings by the risk premiums and add the risk-free rate. We use 5% market risk premium, 3% SMB risk premium, and 5% HML risk premium. We use the 10-year treasury bond rate on the date of the IPO as the risk-free rate. 10.8% is the average discount rate at the fund level. Because of the high decay rate, reasonable changes in the discount rate do not sensibly affect the estimate of the present value.

3 Robustness of the RDD estimates

Dong (2015) shows that the conventional fuzzy RDD estimator may be biased when the running variable is discrete and rounded down. However, the bias is equal to zero when the slopes (and higher derivatives) of the outcome and the treatment, as functions of the forcing variable, do not change around the cutoff. In Table 3 of the paper, we notice that the coefficient for the forcing variable x is weakly significant in only one specification, while the interaction term z_x is not statistically different from zero. Hence, we do not expect this bias to significantly affect our results. Two additional pieces of evidence suggest that the discretization of the forcing variable does not affect our conclusions.

First, Dong (2015) derives a formula to correct for the bias that arise when the running variable is discrete. Under standard assumptions, the fuzzy RDD local average treatment effect can be expressed as the ratio between the intent-to-treat effect (θ_1) and the coefficient of the first-stage regression of the treatment variable on the assignment-to-treatment variable (γ_1): $\hat{\beta}_{FRD} = \frac{\hat{\theta}_1}{\hat{\gamma}_1}$ Dong shows that this ratio is biased when the forcing variable is discrete and rounded. The direction of the bias depends on the change in the slope (and higher derivatives) of the outcome and the treatment, as functions of the forcing variable, around the cutoff. In order to implement Dong's correction, we need to assume a polynomial relation between underpricing and age. Given the structure of our data, we consider the case of a linear relation only. In this case, Dong's bias-corrected version of $\hat{\beta}_{FRD}$ can be computed as:

$$\hat{\beta}_{FRD} = \frac{\hat{\theta}_1 - \frac{1}{2}\hat{\theta}_3}{\hat{\gamma}_1 - \frac{1}{2}\hat{\gamma}_3}$$

where $(\hat{\gamma}_1, \hat{\gamma}_3)$ and $(\hat{\theta}_1, \hat{\theta}_3)$ are estimated via Equations (2) and (3), respectively.

Focusing on the $h = 3$ case, we find that the linear correction changes the estimated FRD coefficient of *AffiliatedAllocDummy* from 24.8 to 27.35. The coefficient of *AffiliatedAllocPerc* changes from 5.43 to 6.1. The bias, if any, seems to work against finding results, thus suggesting that our results in section 4 of the paper are conservative.

Second, for a small subsample of 308 IPOs we know the exact founding date at the day or month level and can compute a more precise age of the firm at the issue date;[4] 43 of these IPOs fall within the one-year bandwidth around the cutoff point. Table W5 replicates the fuzzy RDD analysis of section 3 of the paper for these 43 IPOs.[5] Given their precise age, we can, in principle, control for the underlying relation between underpricing and age within the one-year bandwidth. However, the small sample size might affect the statistical significance of the estimates and the validity of the instrument. Hence, these results should be interpreted cautiously.

[Table W5 about here.]

[4]We use two sources to get these more precise founding dates. First, we use the precise founding date from SDC whenever the SDC founding year is consistent with Ritter's founding year and the date is not January 1st (280 observations). Second, we manually check founding dates on S-1 registration forms for all the other 2-4 years old IPOs and find more precise founding dates for 38 IPOs.

[5]The bandwidth selector proposed by Calonico et al. (2014) would include 33 IPOs with age between 2.2 and 3.8 years. This is very close to the one-year bandwidth that we use for consistency with our baseline analysis.

The coefficients of *AffiliatedAllocPerc* and *AffiliatedAllocDummy* are always positive in all specifications. We notice that the estimates of model (1) are very similar in magnitude to the results reported in Table 3 of the paper. The results of model (2) and model (3) are quantitatively consistent with Table 3 of the paper, but their estimates are statistically insignificant. We acknowledge that the instrument z becomes weak in models (2) and (3), when we introduce x and z_x as control variables in the first-stage regression. Model (3), in particular, suffers from multicollinearity. Nevertheless, Table W5 suggests that the positive effect documented in section 3 of the paper is unlikely to be driven entirely by the discrete nature of our forcing variable.

Our main treatment variables (*AffiliatedAllocPerc* and *AffiliatedAllocDummy*) measure allocations to underwriter-affiliated funds without distinguishing the role played by the affiliated underwriter in the syndicate. Hence, Table 3 of the paper implicitly assumes that the lead managers set the IPO offer price while acting in the interests of the underwriting syndicate as a whole. This is plausible for two reasons. First, underwriting syndicates are formed on the basis of long-term relationships among investment banks (Corwin and Schultz (2005)). Therefore, lead underwriters may take the value of these relationships into account when making their pricing decisions. Second, according to Rule 10(f)-3, affiliated allocations must be executed by a syndicate member other than the affiliated underwriter. This feature opens the door for quid-pro-quos in which a lead underwriter A underprices an IPO when allocating shares to funds affiliated to the syndicate member B with the expectation that bank B would give back the favor when acting as a lead underwriter of another IPO. However, if the lead managers act in their own interests, they may choose the IPO price to maximize their own profit as a function of the allocations received by their own affiliated funds. For robustness, Table W6 replicates the fuzzy RDD analysis of section 3 of the paper, using as the treatment variable the allocation received by funds affiliated with the lead underwriters only. If anything, our second stage results are stronger. However, we acknowledge that the instrument becomes weak in some specifications of Panel (A), according to the first stage F statistic. The reason is that the percentage of the issue allocated to funds affiliated to the lead underwriters is about as half as the percentage of the issue allocated to affiliated funds as a whole, thus reducing the jump of *AffiliatedAllocPerc* around the cutoff.

[Table W6 about here.]

We show that our results are overall robust to controlling for industry. First, Table W7 breaks down average underpricing by industry and age. It shows that underpricing is on average higher above the cutoff than below the cutoff in most of the 12 Fama-French industries, especially closer to the cutoff. Second, Table W8 introduces in our RDD regressions industry fixed effects and shows that the results are overall similar to the baseline results in the paper.

[Table W7 about here.]

[Table W8 about here.]

Our results are robust to controlling for time fixed effects. First, Table W9 breaks down average underpricing by sub-periods and age. It shows that underpricing is on average higher above the cutoff than below the cutoff in all the sub-periods. Second, Table W10 introduces in our RDD regressions sub-periods fixed effects and shows that the results are overall similar to the baseline results in the paper.

[Table W9 about here.]

[Table W10 about here.]

In the paper, we winsorize all variables at the 2.5% level. Table W11 shows that our results are quantitatively similar if we use different winsorization thresholds: 0.5% (Columns (1)-(2)), 1% (Columns (3)-(4)), and 5% (Columns (5)-(6)).

[Table W11 about here.]

Section 2.2 of the paper shows that eight IPOs with affiliated allocations do not satisfy the age requirement of the 10(f)-3 rule. Since there is some uncertainty around their non-compliance status, we repeat our main analyses excluding these IPOs from the sample. Our results get stronger (Table W12).

[Table W12 about here.]

4 Discussion of the control variables and fixed-effects in the OLS regression of Table 5

We describe and discuss the coefficients of control variables in Table 5 of the paper and show that they are overall consistent with the existing literature. All variables are defined in Table 1 of the paper.

We include in all specifications the percentage allocation received by non-affiliated funds, *IndependentAllocPerc*, in order to control for the effect of private information possessed by financial institutions. Consistent with Aggarwal et al. (2002), we find that *IndependentAllocPerc* is positively related to underpricing in all regressions and the coefficient estimates are statistically significant at the 1% level. This result is in line with the partial adjustment literature (Hanley (1993)): financial institutions seem to have private information which is not fully incorporated into the offer price during the bookbuilding process. It is also consistent with the conflicts of interest literature, as the positive coefficient might be driven by underwriters favoring some clients with the allocation of underpriced shares (Reuter (2006), Goldstein et al. (2011)).

$ln(Age + 1)$ and $ln(Assets)$ are negatively correlated with underpricing. Consistent with the standard "winner's curse" (Rock (1986)) and bookbuilding (Benveniste and Spindt (1989)) arguments, underpricing is higher when the information asymmetry about the issuer is more pronounced, that is, when the issuer is younger and smaller. However, statistical significance varies across the model specifications: $ln(Age + 1)$ is always statistically significant at conventional levels; $ln(Assets)$ becomes insignificant only when other variables highly correlated with it and potentially prone to endogeneity problems, such as the issue size and the syndicate size, are added to the specification. Consistent with the partial adjustment literature, the coefficient for *Adjustment* is positive and statistically significant at the 1% level in all specifications. The coefficients for *OnlyPrimaryShares*, *Nasdaq* and *Foreign*, however, are not significantly different from zero.

Columns (3) and (8) of Table 6 introduce additional control variables that might affect both underpricing and allocations. We introduce them in a separate specification because of endogeneity concerns.

Lowry et al. (2017) notice that, since the 1990s, the largest IPOs are frequently the most underpriced. Indeed, we find a positive correlation between $ln(Proceeds)$ and the first day return in most specifications. However, the coefficient is not statistically significant.

Consistent with Lee and Wahal (2004), we find that venture capital backed IPOs have significantly higher underpricing. This positive relation is consistent with the "grandstanding effect" described by Gompers (1996), but it might also be due to endogeneity, as the $VentureCapitalBack$ dummy might capture the effect of firm characteristics positively related to the first day return (Lowry et al. (2017)).

Aggarwal et al. (2002) argue that the IPO process might take longer in times of high issuance volume and high underpricing, thus generating a positive correlation between the first day return and the amount of time spent in registration. In contrast, we find that the length of the IPO process is significantly negatively related to underpricing: an additional month spent in the registration process is associated with a decrease of about 0.3 percentage points in the first day return. This finding is broadly consistent with the intuitive idea that underwriters can price the issue more accurately when they have more time to do it.

The variable $HighRankDummy$, which is a dummy equal to one if at least one underwriter has a Carter-Manaster rank of 9, is positively related to underpricing. Although the statistical significance is weak, this positive relation is broadly consistent with the existing literature (Beatty and Welch (1996), Loughran and Ritter (2004), and Ritter and Zhang (2007)) and might be driven by endogeneity, as riskier and more difficult-to-price issuers, with higher expected underpricing, are more likely to choose highly ranked underwriters to perform their IPOs (Habib and Ljungqvist (2001) and Lowry et al. (2017)).

The syndicate size and the number of lead underwriters are not significantly related to underpricing.[6] Hence, we do not find evidence in favor of larger syndicates being able to produce more information during the bookbuilding process. However, endogeneity problems work against finding such a result, as issuers whose value is more uncertain and whose expected underpricing is higher are more likely to hire larger syndicates (Lowry et al. (2017)).

Finally, we find a positive relation between the gross underwriting spread and the first day return. This is consistent with the existing literature and with the idea that underpricing and gross spreads are complements: underwriters that can charge high spreads to their customers are also able to leave more money on the table (Kim et al. (2010) and Ritter (2011)).

[6]Regression diagnostics raise a weak concern of multicollinearity by introducing *NumberLeadManagers* as a regressor. For robustness, we run the same regressions excluding it from the independent variables and our results do not sensibly change (not reported).

Columns (4) and (9) of Table 6 introduce year and industry dummy variables, to control for year-specific and industry-specific effects on underpricing and affiliated allocations. In order to define industry dummies, we use SIC codes and we implement the Fama-French 12-industries classification (Fama and French (1997)), as available on Kenneth French's website.[7] In columns (5) and (10), we introduce variables that control for lead underwriters' specific effects on underpricing and affiliated allocations. Controlling for underwriter-specific effects might be important for at least two reasons. First, Hoberg (2007) finds underpricing to have a persistent underwriter-specific component. Second, in section 1 of this Web Appendix we find that the affiliated allocation business is dominated by a few underwriters and that there is some variation in their propensity to allocate underpriced shares to affiliated funds. Therefore, for each underwriter j, we define the variable $uwFE_{i,j}$ to be equal to 1 if the underwriter is a lead manager of IPO i.[8] It is important to note that these underwriter-specific control variables are not mutually exclusive, as an IPO can have more than one lead manager in its syndicate. Year and industry fixed effects and underwriter-specific controls do not seem to have a major impact on the correlation between underpricing and our affiliated allocation measures.

One potential concern with the OLS regression is that we have noisy data on other institutional investors' allocations. This makes it difficult to compare the magnitudes of the coefficients of affiliated allocations and other institutions' allocations, due to potential attenuation bias. For robustness, we re-run our OLS regression on the subset of IPOs that occur in March, June, September, and December, since the time between the IPOs and disclosed holdings is shorter. Table W13 reports the results and shows that magnitudes are overall very similar to our results in Table 5 of the paper. Statistical significance decreases in some specifications because of the much lower number of observations.

[Table W13 about here.]

[7]The link is: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/index.html

[8]In order to define the underwriter-specific variable $uwFE_{i,j}$, we require the underwriter j to be a lead manager at least four times in our dataset. Moreover, we require the underwriter j to be involved in at least one 10(f)-3 transaction in our dataset. These filters allow us to define the variable $uwFE_{i,j}$ for 33 distinct lead underwriters.

5 A stylized model for affiliated allocations

Consider a model with risk neutral agents, no discounting, and two possible equally likely states for the IPO firm: good and bad. An underwriter is conducting the IPO of an unlevered firm whose payoffs are 1 dollar in the good state and 0 in the bad state. The existing shareholders of the firm are selling 100% of their stakes and no new funds are raised. Hence, the fair price of this IPO when its state is not known is $1/2$ dollar.

The underwriter decides which investors to offer the IPO to, the price at which the IPO is sold, P with $P \in (0,1)$, and the final allocations to investors. The firm's existing shareholders pay to the underwriter a commission cP at the completion of the IPO, where c is the commission spread, using the proceeds from the sale. We treat c as a constant in this model. There are three types of investors:

-Favored clients (henceforth also referred to as "favored investors") can send kickbacks to the underwriter to receive IPO allocations only when the IPO is underpriced. If these clients give to the underwriter a fraction k of their *expected* revenues from investing in the IPO, then the underwriter allocates to them a fraction θ of the IPO only when the IPO is underpriced, with $\theta \leq \bar{\theta}$. If these clients do not send kickbacks, then they will not receive allocations. This way of modelling the kickback game is consistent with Goldstein et al. (2011), who show that institutional investors send most of their kickbacks during the 10 days *before* the IPO, thus only knowing the *expected* underpricing.

-Affiliated funds are managed by the underwriter and can be allocated a fraction α of the IPO, with $\alpha \leq \bar{\alpha}$. We model the nepotism incentives of the underwriter by assuming that the underwriter's profit function is proportional to these funds' underpricing gains at the rate m. (The parameter m can be naturally thought as the percentage management fee earned by the fund managers, but it may also be thought as capturing, in reduced form, any additional gains from larger fund inflows due to the underpricing gains.)

-Regular investors include other independent institutions and retail investors. They can decide whether to participate in the IPO, while taking into account the fact that the underwriter may give preferential treatment to favored clients and affiliated funds. If they participate, they receive any residual allocation to complete the IPO.

The IPO firm's existing shareholders have a reservation price equal to $\bar{P}$, which leaves them with $(1-c)\bar{P}$ net proceeds. The values of $\bar{P}$, c, k, m, $\bar{\theta}$, and $\bar{\alpha}$ are common knowledge. We make the following permanent assumptions:

Assumption 1. *(a)* $\bar{\alpha}+\bar{\theta}<1$*; (b)* $\bar{\alpha}<\bar{\theta}$*.* ***Assumption 2.*** $\bar{P}<\frac{1-\bar{\theta}}{2-\bar{\theta}}$.

Assumption 1.a implies that the underwriter needs regular investors to participate, otherwise the IPO fails. Assumption 1.b is arguably realistic, and it simplifies the analysis by reducing the number of cases to be considered. Assumption 2 is not necessary, but as will become clear below, it allows us to focus on the interesting cases in which the underwriter receives kickbacks from favored clients.

The timeline of the model is the following:

Time 0 ("Roadshow" stage):

- The underwriter announces P and chooses the investors to whom to offer the IPO.
- Everyone observes P and to whom the IPO has been offered.

Time 1 ("Participation decision" stage):

- Regular investors decide whether to participate in the IPO.
- Favored investors pay kickbacks (if they were offered the IPO).

Time 2 ("Final allocations" stage):

- The underwriter observes the true state of the firm and makes the final allocations, within the subset of investors to whom the IPO has been offered.
- The IPO is completed.

Time 3 ("Payoff realization" stage):

- The IPO firm's final payoffs are realized, and all outstanding claims are settled.

We assume throughout that whenever the underwriter is indifferent among alternative choices, it makes the choice that is more convenient for the IPO firm.

5.1 Benchmark case: the underwriter sets the IPO price to its fair value

As a benchmark case, we analyze the situation in which the underwriter only offers the IPO to regular investors at time 0 (hence, there are no favored investors nor affiliated funds that can participate). Let this be the profit function of the underwriter: $\pi = cP$, where c is the commission spread and P is the IPO price.

The investors' participation constraint is:

$$\frac{1}{2}(1-P)+\frac{1}{2}(0-P)\geq 0$$

which gives $P \leq 1/2$. Since the underwriter's profit increases with P, the chosen price is the fair price:

$$\boldsymbol{P^*=\frac{1}{2}}$$

The underwriter's profit under fair play is $\pi^* = \frac{1}{2}c$.

5.2 Kickback-only game

As a second benchmark we now analyze the case in which, at time 0, the underwriter can offer the IPO only to favored clients and regular investors, for example because the regulation prohibits allocations to affiliated funds. The underwriter gets two sources of revenues: underwriting commissions, which are a fraction c of the IPO proceeds, and kickbacks from favored clients, who send to the underwriter a fraction k of their expected revenues from underpricing. Overall, the underwriter must commit to a price P which is low enough to attract all the investors and high enough not to trigger withdrawal by the IPO firm, while playing the kickback game with its favored clients and maximizing its profits.

At time 2, the underwriter observes the true state. If the IPO is in the bad state, then it is overpriced, and the underwriter allocates 0 shares to favored clients and 100% of the IPO to regular investors. If the IPO is in the good state, then it is underpriced, and the underwriter allocates a fraction θ to favored clients and a fraction $1-\theta$ to regular investors.

At time 0, the underwriter chooses P and θ to maximize its expected profits subject to the participation constraint of regular investors, the participation constraint of the IPO firm, and the restriction on $0 \leq \theta \leq$

$\bar{\theta}$. The expected profit of the underwriter is:

$$\pi = cP + \frac{1}{2}k(1-P)\theta$$

The participation constraint of regular investors is given by:

$$\frac{1}{2}(1-P)(1-\theta) + \frac{1}{2}(0-P) \geq 0$$

Which gives:

$$P \leq \frac{1-\theta}{2-\theta}$$

The participation constraint of the IPO firm is: $P \geq \bar{P}$. Notice that, because of assumption 2, the participation constraint of the IPO firm is always compatible with the participation constraint of regular investors. We can write the problem of the underwriter as:

$$\max_{P,\theta} \quad cP + \frac{1}{2}k(1-P)\theta$$

$$\text{s.t.} \qquad \bar{P} \leq P \leq \frac{1-\theta}{2-\theta}$$

$$0 \leq \theta \leq \bar{\theta}$$

We can distinguish two main cases.

1. If $k \leq \frac{2c}{\bar{\theta}}$, then the underwriter's profit function increases with P for any admissible value of θ. Hence, the participation constraint of regular investors is binding and the underwriter pricing choice as a function of θ is:

$$P^*(\theta) = \frac{1-\theta}{2-\theta}$$

Notice that $P^*(\theta) \leq \frac{1}{2}$ and $\frac{\partial P^*(\theta)}{\partial \theta} < 0$. The IPO is underpriced because of the winner's curse faced by regular investors, who take into account that the underwriter gives preferential treatment to favored clients. Moreover, the underpricing increases with θ: the higher θ, the more severe the winner's curse is, and the higher the discount required by regular investors is.

We can plug this participation constraint into the underwriter's profit function and obtain:

$$\max_{\theta} \quad c\frac{1-\theta}{2-\theta} + k\frac{\theta}{2(2-\theta)}$$

$$\text{s.t.} \qquad 0 \leq \theta \leq \bar{\theta}$$

The underwriter faces a trade-off. On the one hand, a higher θ increases the expected kickback profits (the second part of the profit function) via two routes. First, a higher θ increases the allocation to favored clients, which increases the kickback profits for any level of P. Second, a higher θ decreases the IPO price P via the winner's curse channel, thus increasing the kickbacks from favored clients' underpricing profits. On the other hand, a higher θ decreases the profits from underwriting commissions (the first part of the profit function) because of its negative effect on the IPO price P. The first derivative of the profits with respect to θ is:

$$\frac{\partial \pi}{\partial \theta} = \frac{k - c}{(2 - \theta)^2}$$

Which is positive whenever $k > c$. Hence, the underwriter offers the maximum possible fraction of the IPO (i.e., $\theta^* = \bar{\theta}$) to favored clients whenever $k > c$, while it offers no shares (i.e., $\theta^* = 0$) to favored clients when $k \leq c$. In summary:

- If $k \leq c$, then the underwriter prefers to play a fair game and it does not underprice the IPO. It chooses:

$$\boldsymbol{\theta^* = 0}$$

$$\boldsymbol{P^* = \frac{1}{2}}$$

The underwriter's expected profit is $\pi^* = \frac{1}{2}c$. Regular investors just break-even.

- $c < k \leq \frac{2c}{\bar{\theta}}$, then the underwriter prefers to play the kickback game and it underprices the IPO just enough to meet regular investors' participation constraint. It chooses:

$$\boldsymbol{\theta^* = \bar{\theta}}$$

$$\boldsymbol{P^* = \frac{1 - \bar{\theta}}{2 - \bar{\theta}}}$$

The underwriter's expected profits are $\pi^* = \frac{2c - (2c - k)\bar{\theta}}{2(2 - \bar{\theta})}$. Favored investors make an expected profit of $\frac{1}{2}(1 - k)\frac{\bar{\theta}}{2 - \bar{\theta}}$. Regular investors just break even.

2. If $k > \frac{2c}{\bar{\theta}}$, then the underwriter's profit function decreases with P for some admissible values of θ. Below, we show that in this case the optimal choice of the underwriter is to offer the highest possible

fraction of shares to favored clients while underpricing as much as possible. Hence, in this case, the binding participation constraint is the one of the IPO firm. In summary:

- If $k > \frac{2c}{\bar{\theta}}$, then the underwriter prefers to play the kickback game and underprices the IPO as much as possible. It chooses:

$$\boldsymbol{\theta}^* = \overline{\boldsymbol{\theta}}$$
$$\boldsymbol{P}^* = \overline{\boldsymbol{P}}$$

The underwriter's expected profit is $\pi^* = c\bar{P} + \frac{1}{2}k(1-\bar{P})\bar{\theta}$. Favored investors make an expected profit of $\frac{1}{2}(1-k)(1-\bar{P})\bar{\theta}$. Regular investors make an expected profit of $\frac{1}{2}(1-\bar{P})(1-\bar{\theta}) - \frac{1}{2}\bar{P}$.

<u>Proof</u>. The underwriter's profit function decreases with P if $\theta > \frac{2c}{k}$ and increases with P if $\theta \leq \frac{2c}{k}$. Hence, the profit-maximizing solution is binding at either the participation constraint of regular investors or the IPO firm. Given that $k > \frac{2c}{\bar{\theta}}$ implies $k > c$, we know from point 1 that the highest profit for the underwriter conditional on the participation constraint of regular investors being binding is obtained when $\theta = \bar{\theta}$. However, since in this case the profit function of the underwriter monotonically decreases with P at $\theta = \bar{\theta}$, then the underwriter can increase its profit by lowering the IPO price. This implies that the participation constraint of regular investors is not binding at the optimal solution. Hence, the participation constraint of the IPO firm is binding and, thus, $P^* = \bar{P}$. If $P^* = \bar{P}$, then the underwriters' profit function is $\pi^* = c\bar{P} + \frac{1}{2}k(1-\bar{P})\theta$, which increases with θ. Hence: $\theta^* = \bar{\theta}$.

Figure W1 summarizes all these results in the space (k, m), which is convenient for comparisons with the later cases in which we allow for affiliated allocations.

[Figure W1 about here.]

It is noteworthy that favored investors make a higher total profit than regular investors. In the case $k \leq \frac{2c}{\bar{\theta}}$, it is obvious. In the case $k > \frac{2c}{\bar{\theta}}$, the total profit for favored investors is higher than or equal to the total profit for regular investors when:

$$\bar{P} \geq \frac{1 + k\bar{\theta} - 2\bar{\theta}}{2 + k\bar{\theta} - 2\bar{\theta}}$$

If $\bar{\theta} > 1/(2-k)$, then the inequality is satisfied for any $\bar{P} > 0$, which are the admissible values of $\bar{P}$. If $\bar{\theta} \leq 1/(2-k)$, then we need to check that this constraint is compatible with the upper bound of $\bar{P}$. That is:

$$\frac{1 + k\bar{\theta} - 2\bar{\theta}}{2 + k\bar{\theta} - 2\bar{\theta}} \leq \frac{1-\bar{\theta}}{2-\bar{\theta}}$$

Which gives $k \leq 1$, which is also always satisfied for any admissible value of k. Although, this result is not necessary within the model (in the model, favored clients are always better off paying the kickback than receiving zero allocations), it reassures us that it is convenient for favored clients to accept being treated as such.

Overall, this benchmark case suggests a tempting, but incorrect, intuition: the underwriter allocates shares to whichever investor category maximizes the underwriter's direct linear payoff, subject to the participation constraints of the other investors and of the IPO firm. We will now see that this intuition is not correct in the situation of interest to us, in which the underwriter can allocate shares to regular investors, favored investors and affiliated funds.

5.3 Affiliated+kickback game

We now turn to the case in which the underwriter can offer the IPO to all types of investors at time 0: regular investors, favored clients, and affiliated funds. The underwriter gets three sources of revenues: underwriting commissions, which are a fraction c of the proceeds, kickbacks from favored clients, which send to the underwriter a fraction k of their expected profits from underpricing as in Section 2, and revenues from affiliated funds proportional to the realized underpricing gains at the rate m.

At time 2, the underwriter observes the true state. Let P be the IPO price determined at time 0, θ be the fraction of the IPO that can be purchased by the favored clients that were invited at time 0, and α be the fraction of the IPO that can be purchased by the affiliated funds that were invited at time 0. If the IPO is in the bad state, then it is overpriced and the underwriter allocates 100% of the IPO to regular investors. If the IPO is in the good state, then it is underpriced and the underwriter allocates a fraction θ to favored clients, a fraction α to affiliated funds, and a fraction $1-\theta-\alpha$ to regular investors.

At time 0, the underwriter chooses P, θ, and α to maximize its expected profits subject to the participation constraint of regular investors, the participation constraint of the IPO firm, and the restrictions on $0 \leq \theta \leq \bar{\theta}$ and $0 \leq \alpha \leq \bar{\alpha}$. The expected profit of the underwriter is:

$$\pi = cP + \frac{1}{2}k(1-P)\theta + \frac{1}{2}m(1-P)\alpha$$

The participation constraint of regular investors is given by:

$$\frac{1}{2}(1-P)(1-\theta-\alpha) + \frac{1}{2}(0-P) \geq 0$$

Which gives: $P \leq \frac{1-\theta-\alpha}{2-\theta-\alpha}$.

The participation constraint of the IPO firm is: $P \geq \bar{P}$. Because of assumption 2, the participation constraint of the IPO firm is not always compatible with the participation constraint of regular investors. Hence, we need to analyze separately two cases:

(a) The reservation price of the IPO firm is low enough and, thus, the PC of the IPO firm is always compatible with the PC of regular investors:

$$\bar{P} \leq \frac{1-\bar{\theta}-\bar{\alpha}}{2-\bar{\theta}-\bar{\alpha}}$$

(b) The reservation price of the IPO firm is relatively high and, thus, the PC of the IPO firm is compatible with the PC of regular investors only if the underwriter does not offer the IPO to all of its favored clients and affiliated funds:

$$\frac{1-\bar{\theta}-\bar{\alpha}}{2-\bar{\theta}-\bar{\alpha}} < \bar{P} \leq \frac{1-\bar{\theta}}{2-\bar{\theta}}$$

5.3.1 Case (a): low reservation price of the IPO firm

Let's start with case (a) and assume $\bar{P} \leq \frac{1-\bar{\theta}-\bar{\alpha}}{2-\bar{\theta}-\bar{\alpha}}$. In this case, we can write the maximization problem of the underwriter as:

$$\max_{P,\theta,\alpha} \quad cP + \frac{1}{2}k(1-P)\theta + \frac{1}{2}m(1-P)\alpha$$

$$\text{s.t.} \qquad \bar{P} \leq P \leq \frac{1-\theta-\alpha}{2-\theta-\alpha}$$

$$0 \leq \theta \leq \bar{\theta}$$

$$0 \leq \alpha \leq \bar{\alpha}$$

The solution is analogous to the one presented in Section 2; we can distinguish two cases.

1. If $k \leq \frac{2c}{\bar{\theta}} - \frac{\bar{\alpha}}{\bar{\theta}} m$, then the underwriter's profit function increases with P for any admissible values of θ and α. Hence, the participation constraint of regular investors is binding and the underwriter pricing choice as a function of θ and α is:

$$P^*(\theta, \alpha) = \frac{1-\theta-\alpha}{2-\theta-\alpha}$$

Notice that, for any given θ, a higher α makes regular investors' winner's curse more severe, thus implying a higher discount on the IPO price. We can plug this participation constraint into the underwriter's profit function and obtain:

$$\begin{aligned} \max_{\theta,\alpha} \quad & c\frac{1-\theta-\alpha}{2-\theta-\alpha} + k\frac{\theta}{2(2-\theta-\alpha)} + m\frac{\alpha}{2(2-\theta-\alpha)} \\ \text{s.t.} \quad & 0 \leq \theta \leq \bar{\theta} \\ & 0 \leq \alpha \leq \bar{\alpha} \end{aligned}$$

Notice how α influences the trade-off faced by the underwriter. Other things equal, on the one hand, the higher α, the lower the IPO price chosen by the underwriter in order to meet the participation constraint of regular investors, and therefore the lower the underwriting commission revenues (the first part of the profit function). On the other hand, a higher α increases the underwriter's expected profits via two routes. First, a higher α increases the allocation to affiliated funds, which directly increases the management-fees profits for any level of P (third part of the profit function). Second, a higher α decreases the IPO price P via the winner's curse channel. This indirectly increases the management-fees profits further because of a higher underpricing (third part of the profit function). However, this effect on P also indirectly increases the kickbacks from favored clients' underpricing profits (second part of the profit function). **Hence, an increase in affiliated allocations contributes to higher kickback revenues, other things being equal**. The partial derivatives of the profits with respect to α and θ are:

$$\frac{\partial \pi}{\partial \alpha} = \frac{\theta(k-m) + 2(m-c)}{2(2-\theta-\alpha)^2}$$

$$\frac{\partial \pi}{\partial \theta} = \frac{\alpha(m-k) + 2(k-c)}{2(2-\theta-\alpha)^2}$$

Notice that $\frac{\partial\pi}{\partial\alpha} > 0 \Leftrightarrow \theta < 2\frac{m-c}{m-k}$ and $\frac{\partial\pi}{\partial\theta} > 0 \Leftrightarrow \alpha < 2\frac{k-c}{k-m}$. Hence, for any admissible value of θ, underwriters' profits are either increasing or decreasing with α; similarly, for any admissible value of α, underwriters' profits are either increasing or decreasing with θ. Hence, the profit-maximizing pair (θ^*, α^*) is a corner solution. By comparing the profits generated by each pair of potential optimal corner solutions $\pi^*(\bar{\theta}, \bar{\alpha})$, $\pi^*(\bar{\theta}, 0)$, $\pi^*(0, \bar{\alpha})$, and $\pi^*(0,0)$, we find the following:

- If $k \leq c$ and $m \leq c$, then the underwriter prefers to play a fair game and it does not underprice the IPO. It chooses:

$$\boldsymbol{\theta^* = \alpha^* = 0}$$

$$\boldsymbol{P^* = \frac{1}{2}}$$

The underwriter's expected profit is $\pi^* = \frac{1}{2}c$. Regular investors just break-even.

- If $k \leq \frac{2c}{\bar{\theta}} - \frac{2-\bar{\theta}}{\bar{\theta}}m$ and $m \leq c$, then the underwriter prefers to play only the kickback game and underprices just enough to meet the regular investors' participation constraint, as in Section 2. It chooses:

$$\boldsymbol{\theta^* = \bar{\theta}}$$

$$\boldsymbol{\alpha^* = 0}$$

$$\boldsymbol{P^* = \frac{1-\bar{\theta}}{2-\bar{\theta}}}$$

The underwriter's expected profits are $\pi^* = \frac{2c-(2c-k)\bar{\theta}}{2(2-\bar{\theta})}$. Favored investors make an expected profit of $\frac{1}{2}(1-k)\frac{\bar{\theta}}{2-\bar{\theta}}$. Regular investors just break even.

- If $k \leq \frac{2c}{2-\bar{\alpha}} - \frac{\bar{\alpha}}{2-\bar{\alpha}}m$ and $m > c$, then the underwriter prefers to play only the affiliated game and underprices just enough to meet the regular investors' participation constraint. It chooses:

$$\boldsymbol{\theta^* = 0}$$

$$\boldsymbol{\alpha^* = \bar{\alpha}}$$

$$\boldsymbol{P^* = \frac{1-\bar{\alpha}}{2-\bar{\alpha}}}$$

The underwriter's expected profits are $\pi^* = \frac{2c-(2c-m)\bar{\alpha}}{2(2-\bar{\alpha})}$. Affiliated funds make a profit of

$\frac{1}{2}\frac{m\overline{\alpha}}{2-\overline{\alpha}}$. Regular investors just break even.

- If $k > \frac{2c}{\overline{\theta}} - \frac{2-\overline{\theta}}{\overline{\theta}}m$, $k > \frac{2c}{2-\overline{\alpha}} - \frac{\overline{\alpha}}{2-\overline{\alpha}}m$, and $k \leq \frac{2c}{\theta} - \frac{\overline{\alpha}}{\theta}m$, then the underwriter prefers to play both games and underprices just enough to meet the regular investors' participation constraint. It chooses:

$$\boldsymbol{\theta}^* = \overline{\boldsymbol{\theta}}$$

$$\boldsymbol{\alpha}^* = \overline{\boldsymbol{\alpha}}$$

$$\boldsymbol{P}^* = \frac{\mathbf{1} - \overline{\boldsymbol{\theta}} - \overline{\boldsymbol{\alpha}}}{\mathbf{2} - \overline{\boldsymbol{\theta}} - \overline{\boldsymbol{\alpha}}}$$

The underwriter's expected profits are $\pi^* = \frac{2c-(2c-k)\overline{\theta}-(2c-m)\overline{\alpha}}{2(2-\overline{\theta}-\overline{\alpha})}$. Favored investors' expected profit is $\frac{1}{2}(1-k)\frac{\overline{\theta}}{2-\overline{\theta}-\overline{\alpha}}$. Affiliated funds make a profit of $\frac{1}{2}\frac{m\overline{\alpha}}{2-\theta-\overline{\alpha}}$. Regular investors just break even.

Figure W2 summarizes these results (ignore the darkest region for the moment). The intuition for the condition $k > \frac{2c}{\overline{\theta}} - \frac{2-\overline{\theta}}{\overline{\theta}}m$ is the following. As we have seen, allocating shares to affiliated funds has two benefits. First, a direct revenue via management fee: intuitively, a higher m makes it easier for the above condition to be satisfied and, thus, makes the underwriter prefer playing the kickback+affiliated game than the kickback-only game. Second, affiliated allocations increase underpricing because of a more severe winners' curse. This, in turn, increases the underwriter's revenues via kickbacks. Hence, a higher k makes it easier for the above condition to be satisfied. Furthermore, a higher $\overline{\theta}$ makes it easier for the condition to be satisfied (whenever $m \leq c$, which is the situation that matters for the choice between the affiliated+kickback game and the kickback-only game). When the above condition is not satisfied, then these additional revenues are not enough to compensate for the lost IPO proceeds due to higher underpricing and the underwriter prefers to play only the kickback game. The intuition for the condition $k > \frac{2c}{2-\overline{\alpha}} - \frac{\overline{\alpha}}{2-\overline{\alpha}}m$ is analogous, but it relates to the choice of playing the affiliated+kickback game instead of the affiliated-only game. Allocating shares to favored clients has two benefits: one direct benefit in terms of kickback revenues and one indirect benefit in terms of higher affiliated revenues due to higher underpricing. Hence, we have a similar complementarity between k and m, which both contribute to making it easier for the above condition to be satisfied.

[Figure W2 about here.]

2. If $k > \frac{2c}{\bar{\theta}} - \frac{\bar{\alpha}}{\bar{\theta}} m$, then the underwriter's profit function decreases with P for some admissible values of θ and α. Below, we show that in this case the optimal choice of the underwriter is to offer the highest possible fraction of shares to favored clients and affiliated funds while underpricing as much as possible. Hence, in this case, the binding participation constraint is the one of the IPO firm. In summary:

- If $k > \frac{2c}{\bar{\theta}} - \frac{\bar{\alpha}}{\bar{\theta}} m$, then the underwriter prefers to play the kickback+affiliated game and underprices the IPO as much as possible. It chooses:

$$\boldsymbol{\theta}^* = \bar{\boldsymbol{\theta}} \qquad \boldsymbol{\alpha}^* = \bar{\boldsymbol{\alpha}} \qquad \boldsymbol{P}^* = \bar{\boldsymbol{P}}$$

The underwriter's expected profit is $\pi^* = c\bar{P} + \frac{1}{2}k(1-\bar{P})\bar{\theta} + \frac{1}{2}m(1-\bar{P})\bar{\alpha}$. Favored investors make an expected profit of $\frac{1}{2}(1-k)(1-\bar{P})\bar{\theta}$. Affiliated funds make an expected profit of $\frac{1}{2}m(1-\bar{P})\bar{\alpha}$. Regular investors make an expected profit of $\frac{1}{2}(1-\bar{P})(1-\bar{\theta}-\bar{\alpha}) - \frac{1}{2}\bar{P}$.

Proof. The underwriter's profit function decreases with P if $\theta > \frac{2c}{k} - \frac{m}{k}\alpha$ and increases with P if $\theta \leq \frac{2c}{k} - \frac{m}{k}\alpha$. Hence, the profit-maximizing solution is binding at either the participation constraint of regular investors or the IPO firm. Given that $k > \frac{2c}{\bar{\theta}} - \frac{\bar{\alpha}}{\bar{\theta}} m$ implies $k > \frac{2c}{\bar{\theta}} - \frac{2-\bar{\theta}}{\bar{\theta}} m$ and $k > \frac{2c}{2-\bar{\alpha}} - \frac{\bar{\alpha}}{2-\bar{\alpha}} m$ for any admissible values of the parameters, we know from point 1 that the highest profit for the underwriter conditional on the participation constraint of regular investors being binding is obtained when $\theta = \bar{\theta}$ and $\alpha = \bar{\alpha}$. However, since the profit function of the underwriter monotonically decreases with P at $\theta = \bar{\theta}$ and $\alpha = \bar{\alpha}$, then the underwriter can increase its profit by lowering the IPO price. This implies that the participation constraint of regular investors is not binding at the optimal solution. Hence, the participation constraint of the IPO firm is binding and, thus, $P^* = \bar{P}$. If $P^* = \bar{P}$, then the underwriter's profit function is $\pi^* = c\bar{P} + \frac{1}{2}k(1-\bar{P})\theta + \frac{1}{2}m(1-\bar{P})\alpha$, which increases with θ and α. Hence: $\theta^* = \bar{\theta}$ and $\alpha = \bar{\alpha}$.

Notice, again, that both a higher m and a higher k can make the underwriter willing to play the kickback+affiliated game and underprice as much as possible. The darkest region of Figure W2 captures this case.

5.3.2 Case (b): relatively high reservation price of the IPO firm

Let's turn to case (b) and assume $\frac{1-\bar{\theta}-\bar{\alpha}}{2-\bar{\theta}-\bar{\alpha}} < \bar{P} \leq \frac{1-\bar{\theta}}{2-\bar{\theta}}$. The reservation price of the IPO firm is relatively high and, thus, the PC of the IPO firm is compatible with the PC of regular investors only if the underwriter does not offer the IPO to all its favored clients and affiliated funds. If the underwriter offers the IPO to all its favored and affiliated clients, the IPO fails, and the underwriter's profit is zero. Hence, some favored and/or affiliated clients will be rationed to make the IPO go through. Remembering that $\bar{\theta} > \bar{\alpha}$ by assumption 1b, we can write the maximization problem of the underwriter as:

$$\max_{P,\theta,\alpha} \quad cP + \frac{1}{2}k(1-P)\theta + \frac{1}{2}m(1-P)\alpha$$

$$\text{s.t.} \qquad \bar{P} \leq P \leq \frac{1-\theta-\alpha}{2-\theta-\alpha}$$

$$0 \leq \theta \leq \bar{\theta} - \alpha$$

$$0 \leq \alpha \leq \bar{\alpha}$$

The solution is similar to the previous cases, with the relevant difference that the underwriter is constrained to allocate at most $\bar{\theta}$ to favored and affiliated investors (i.e., $\theta + \alpha \leq \bar{\theta}$ from the second constraint). Similar to the previous cases, we can argue that the profit-maximizing triple $(P^*, \theta^*, \alpha^*)$ is one of the following corner solutions, depending on parameter values: $(\bar{P}, \bar{\theta} - \bar{\alpha}, \bar{\alpha})$, $(\bar{P}, \bar{\theta}, 0)$, $(\frac{1-\bar{\theta}}{2-\bar{\theta}}, \bar{\theta} - \bar{\alpha}, \bar{\alpha})$, $(\frac{1-\bar{\theta}}{2-\bar{\theta}}, \bar{\theta}, 0)$, $(\frac{1-\bar{\alpha}}{2-\bar{\alpha}}, 0, \bar{\alpha})$, and $(\frac{1}{2}, 0, 0)$.

Proof. Because of the linearity of the profit function in P, the optimal price P^* is binding at either the regular investors' participation constraint or the IPO firm's participation constraint. If $P^* = \bar{P}$, then the profit function is increasing with $\theta + \alpha$ and, hence, the constraint $\theta \leq \bar{\theta} - \alpha$ is binding. Hence, $\theta = \bar{\theta} - \alpha$. By plugging $P^* = \bar{P}$ and $\theta = \bar{\theta} - \alpha$ into the profit function, we can see that profits increase with α if and only if $m > k$. Hence α^* is either equal to 0 or $\bar{\alpha}$, which implies that θ^* is either equal to $\bar{\theta}$ or $\bar{\theta} - \bar{\alpha}$. If $P = \frac{1-\theta-\alpha}{2-\theta-\alpha}$, then we know from Section 3.1 that, for any admissible value of α, profits either increase or decrease with θ. Hence, the constraint $0 \leq \theta \leq \bar{\theta} - \alpha$ is binding at one of the two extremes. Similarly, for any admissible value of θ, profits either increase or decrease with α. Hence, the constraint $0 \leq \alpha \leq \bar{\alpha}$ is binding at one of the two extremes and α^* is either equal to 0 or $\bar{\alpha}$, which implies that θ^* is equal to 0, $\bar{\theta}$, or $\bar{\theta} - \bar{\alpha}$. Hence, the potential corner solutions are the ones listed above.

By comparing the underwriter's profits at each of the potential corner solutions, we find the following cases, which are illustrated in Figure W3.

- If $m \leq k$ and $k > \frac{2c}{\overline{\theta}}$, then the underwriter prefers to play the kickback-only game and underprices as much as possible:

$$\boldsymbol{\theta}^* = \overline{\boldsymbol{\theta}} \qquad \boldsymbol{\alpha}^* = \mathbf{0} \qquad \boldsymbol{P}^* = \overline{\boldsymbol{P}}$$

- If $m \leq k$ and $c < k \leq \frac{2c}{\overline{\theta}}$, then the underwriter prefers to play the kickback-only game and underprices just enough to meet the regular investors' participation constraint:

$$\boldsymbol{\theta}^* = \overline{\boldsymbol{\theta}} \qquad \boldsymbol{\alpha}^* = \mathbf{0} \qquad \boldsymbol{P}^* = \frac{\mathbf{1}-\overline{\boldsymbol{\theta}}}{\mathbf{2}-\overline{\boldsymbol{\theta}}}$$

- If $k \leq c$ and $m \leq c$, then the underwriter prefers to play a fair game and does not underprice on average:

$$\boldsymbol{\theta}^* = \mathbf{0} \qquad \boldsymbol{\alpha}^* = \mathbf{0} \qquad \boldsymbol{P}^* = \frac{\mathbf{1}}{\mathbf{2}}$$

- If $m > k$ and $k > \frac{2c}{\overline{\theta}-\overline{\alpha}} - \frac{\overline{\alpha}}{\overline{\theta}-\overline{\alpha}}m$, then the underwriter prefers to play a kickback+affiliated game with substitution between favored and affiliated allocations and underprices as much as possible:

$$\boldsymbol{\theta}^* = \overline{\boldsymbol{\theta}} - \overline{\boldsymbol{\alpha}} \qquad \boldsymbol{\alpha}^* = \overline{\boldsymbol{\alpha}} \qquad \boldsymbol{P}^* = \overline{\boldsymbol{P}}$$

- If $m > k$ and $\frac{2c}{2-\overline{\alpha}} - \frac{\overline{\alpha}}{2-\overline{\alpha}}m < k \leq \frac{2c}{\overline{\theta}-\overline{\alpha}} - \frac{\overline{\alpha}}{\overline{\theta}-\overline{\alpha}}m$, then the underwriter prefers to play a kickback+affiliated game with substitution between favored and affiliated allocations and underprices just enough to meet the regular investors' participation constraint:

$$\boldsymbol{\theta}^* = \overline{\boldsymbol{\theta}} - \overline{\boldsymbol{\alpha}} \qquad \boldsymbol{\alpha}^* = \overline{\boldsymbol{\alpha}} \qquad \boldsymbol{P}^* = \frac{\mathbf{1}-\overline{\boldsymbol{\theta}}}{\mathbf{2}-\overline{\boldsymbol{\theta}}}$$

- If $m > c$ and $k \leq \frac{2c}{2-\overline{\alpha}} - \frac{\overline{\alpha}}{2-\overline{\alpha}}m$, then the underwriter prefers to play the affiliated-only game and underprices just enough to meet the regular investors' participation constraint:

$$\boldsymbol{\theta}^* = \mathbf{0} \qquad \boldsymbol{\alpha}^* = \overline{\boldsymbol{\alpha}} \qquad \boldsymbol{P}^* = \frac{\mathbf{1}-\overline{\boldsymbol{\alpha}}}{\mathbf{2}-\overline{\boldsymbol{\alpha}}}$$

[Figure W3 about here.]

5.4 Using the model to interpret our RDD framework and results

We can use this model to interpret our results by comparing Figure W1 with Figures W2 and W3. Figure W1 illustrates the underwriter's choices for IPOs just below the three-year threshold, while Figures W2 and W3 illustrate the situation for IPOs just above the threshold.

"Compliers" are the IPOs in the regions that are kickback-only or fair in Figure 1 and affiliated+kickback, substitution, or affiliated-only in Figures W2 and W3. The causal effect that we estimate is the average effect on compliers, i.e., the average difference in underpricing in the regions that switch from kickback-only game or fair game to kickback+affiliated game, substitution game, or affiliated-only game. Our estimates do not involve other regions, which are "never-takers" in the RDD language and, thus, do not attempt to explain underpricing for IPOs in general.

For the purposes of keeping the analysis as intuitive as possible, let us focus on the case in which there are complementarities, and the binding participation constraint is the one of regular investors. This case corresponds to the region "HIGH UNDERPRICING, AFFILIATED+KICKBACK GAME" in Figure W2. We know from section 5.3.1 that the IPO price as a function of α and at the optimal level of θ is: $P^*(\alpha) = \frac{1-\bar{\theta}-\alpha}{2-\bar{\theta}-\alpha}$. When the underwriter is constrained to $\alpha = 0$ by regulation, then it only plays the kickback game and it chooses $P^*(0) = \frac{1-\bar{\theta}}{2-\bar{\theta}}$; when the underwriter is allowed to allocate shares to affiliated funds, then it chooses $\alpha = \bar{\alpha}$ and $P^*(\bar{\alpha}) = \frac{1-\bar{\theta}-\bar{\alpha}}{2-\bar{\theta}-\bar{\alpha}}$. Figure W4, which is the same as Figure 3 in the paper, illustrates this point and provides an intuitive representation of our identification strategy.

[Figure W4 about here.]

5.5 Conclusions

Under reasonable assumptions, allocations to favored investors and allocations to affiliated funds have complementary effects on the underwriter's revenues. As a result, the opportunity for the underwriter to allocate IPO shares to affiliated funds does not come at the expense of kickback revenues from favored investors.

Table W1. This table lists the underwriters that are more active in the affiliated allocations market. The table reports the number of eligible IPOs underwritten by each underwriter and the number and percentage of IPOs in which each underwriter has allocated some shares to its affiliated funds.

Underwriter	IPOs underwritten	IPOs allocated	%
JP Morgan (JPM)	390	230	59.0%
Morgan Stanley & Co	307	116	37.8%
Merrill Lynch & Co Inc	234	112	47.9%
Goldman Sachs & Co	321	81	25.2%
Banc of America Securities LLC	196	78	39.8%
Wells Fargo	118	69	58.5%
Deutsche Bank Securities Corp	276	69	25.0%
Jefferies & Co Inc	182	60	33.0%
UBS Investment Bank	262	53	20.2%
Raymond James & Associates Inc	149	50	33.6%
Citigroup	226	43	19.0%
Needham & Co Inc	98	38	38.8%
Credit Suisse First Boston	352	32	9.1%
Wachovia Securities Inc	118	25	21.2%
Other 50 underwriters (average)	50.1	4.6	9.1%

Table W2. Difference-of-means tests with unequal variances (Panel A) and difference-of-proportions tests (Panel B) of IPO characteristics by affiliated allocation dummy. The sample includes 1,086 eligible IPOs, 611 of which have some allocation to affiliated funds (i.e., they are "Allocated"). Variables are defined in Table 1 in the paper. Significance levels are denoted as: * 0.1, ** 0.05, *** 0.01.

(A) Difference-of-means tests

	Allocated	Not Allocated	diff.	t-stat
Underpricing	19.4	7.61	11.8***	10.9
Proceeds	302.0	112.5	189.5***	13.6
Assets	1661.0	952.6	708.4***	5.04
Adjustment	3.08	-7.59	10.7***	14.3
GrossSpread	6.49	6.82	-0.32***	-7.78
Age	26.0	18.9	7.17***	4.43
NumberLeadManagers	2.72	1.94	0.78***	9.48
NumberSyndicateMembers	8.80	5.86	2.94***	11.6
LengthIPOprocess	4.44	4.37	0.066	0.30
IndependentAllocPerc	19.4	16.9	2.49***	3.08

(B) Difference-of-proportions tests

	Allocated	Not allocated	diff.	z-stat
OnlyPrimaryShares	0.42	0.64	-0.22***	-7.44
Nasdaq	0.47	0.79	-0.33***	-11.9
Foreign	0.092	0.10	-0.012	-0.63
VentureCapitalBack	0.40	0.51	-0.11***	-3.47
HighRankDummy	0.92	0.60	0.33***	13.1

Table W3. This table reports the results of the difference-of-means tests with unequal variances of underpricing by the affiliated allocation dummy in different sub-periods (Panel A) and for different underwriters (Panel B). In panel (A), the sample includes 1,086 eligible IPOs, 611 of which have some allocation to affiliated funds. In Panel (B), the sample includes the IPOs underwritten by each of the 14 main underwriters (see Table W1), and the affiliated allocation dummy is defined at the IPO-underwriter level. Significance levels are denoted as: * 0.1, ** 0.05, *** 0.01.

(A) Difference of mean underpricing by sub-periods

	Allocated	Not allocated	diff.	t-stat
2001	17.0	10.9	6.11	1.48
2002	12.0	5.25	6.71	1.48
2003	16.7	9.52	7.18*	1.74
2004	20.5	5.73	14.8***	5.51
2005	14.8	7.08	7.73***	2.67
2006	19.6	5.97	13.6***	4.29
2007	25.8	6.46	19.4***	5.26
2008	16.4	2.64	13.8	1.27
2009	14.8	0.69	14.1***	3.39
2010	13.6	4.24	9.36***	2.74
2011	20.1	10.7	9.38*	1.77
2012	20.8	13.5	7.22	1.34
2013	26.4	14.5	11.9***	2.86

(B) Difference of mean underpricing by underwriters

	Allocated	Not allocated	diff.	t-stat
JP Morgan (JPM)	17.8	6.12	11.7***	6.53
Morgan Stanley & Co	24.0	11.4	12.6***	4.93
Merrill Lynch & Co Inc	24.2	6.23	18.0***	7.68
Goldman Sachs & Co	25.2	13.8	11.3***	3.93
Banc of America Securities LLC	19.6	7.02	12.6***	4.97
Deutsche Bank Securities Corp	24.0	8.29	15.7***	5.47
Wells Fargo	15.6	8.24	7.37**	2.30
Jefferies & Co Inc	20.0	10.6	9.42***	2.97
UBS Investment Bank	24.2	10.4	13.8***	4.19
Raymond James & Associates Inc	20.2	10.8	9.43***	2.79
Citigroup	13.0	11.9	1.02	0.38
Needham & Co Inc	27.1	11.1	16.0***	3.50
Credit Suisse First Boston	17.8	12.4	5.37*	1.71
Wachovia Securities Inc	24.0	11.6	12.4**	2.33

Table W4. Summary statistics of IPO and allocation data for the RDD sample.
This table provides summary statistics at the issuer level for 152 eligible IPOs (Columns (2)-(4)) with 3 ≤ *Age* < 6 and 65 non-eligible IPOs (Columns (5)-(7)) that satisfy all the eligibility requirements except the one about age (i.e., they are less than three years old). Panel (A) summarizes IPO characteristics and Panel (B) summarizes allocation data. For each variable, the table reports its average (mean), its median (p50), and its standard deviation (sd). IPO and allocation variables are defined in Table 1 of the paper.

(A) IPO characteristics

	Eligible			Non-eligible		
	mean	p50	sd	mean	p50	sd
Underpricing (%)	15.7	8.49	20.9	3.88	0.31	11.9
Age (years)	4.25	4	0.77	1.12	1	0.84
Proceeds ($ million)	205.7	95.2	254.6	171.6	139.7	142.8
Assets ($ billion)	1162.6	137.8	2276.2	1801.9	311.1	2772.2
Adjustment	-0.69	0	13.7	-4.54	-3.70	9.26
GrossSpread	6.64	7	0.74	6.60	7	0.60
NumberLeadManagers	2.43	2	1.76	2.65	2	1.46
NumberSyndicateMembers	7.72	6	4.43	7.12	7	3.61
LengthIPOprocess (months)	4.01	3.24	3.08	3.59	2.99	3.28
OnlyPrimaryShares	0.66	1	0.48	0.77	1	0.42
Nasdaq	0.72	1	0.45	0.60	1	0.49
Foreign	0.12	0	0.32	0.38	0	0.49
VentureCapitalBack	0.57	1	0.50	0.25	0	0.43
HighRankDummy	0.80	1	0.40	0.72	1	0.45

(B) Allocation data

	Eligible			Non-eligible		
	mean	p50	sd	mean	p50	sd
AffiliatedAllocPerc (%)	1.36	0.05	2.25	0.23	0	1.21
AffiliatedAllocDummy	0.55	1	0.5	0.12	0	0.33
IndependentAllocPerc (%)	14.3	9.49	14.8	10.1	5.73	12.0

Table W5. Fuzzy RDD in a subsample of IPOs whose exact age is known.
This table contains the second stage coefficients of a local 2SLS regression of *Underpricing* on two measures of affiliated allocations instrumented by z, for a bandwidth h = 1, in a subsample of 33 IPOs whose exact age is known. The two measures are *AffiliatedAllocPerc* (Panel A) and *AffiliatedAllocDummy* (Panel B). z is a dummy variable equal to one if $Age \geq 3$ and zero otherwise, $x = Age - 3$, and $z\_x = z \cdot x$. Relevant statistics from the first stage regression (F, coefficient of z, t-stat of z, and R^2) are also reported. Returns and fractions are expressed as percentages. All non-dummy variables except *Age* are winsorized at the 2.5% level. Heteroschedasticity-robust t-statistics are in parentheses. Significance levels are denoted as: * 0.1, ** 0.05, *** 0.01.

(A)

	(1)	(2)	(3)
AffiliatedAllocPerc	6.95**	3.04	2.25
	(2.19)	(0.80)	(0.61)
x		6.79	12.5
		(1.15)	(1.44)
z_x			-9.04
			(-0.58)
Constant	5.82**	9.45**	12.4**
	(2.58)	(2.60)	(2.15)
F (2nd stage)	4.78	3.43	3.69
F (1st stage)	11.4	6.52	5.28
Coefficient of z (1st stage)	1.70	3.29	2.62
t-stat of z (1st stage)	3.38	1.93	2.15
R^2 (1st stage)	0.12	0.17	0.19
Observations	43	43	43

(B)

	(1)	(2)	(3)
AffiliatedAllocDummy	28.7**	30.3	23.8
	(2.59)	(0.87)	(0.59)
x		-0.70	5.60
		(-0.06)	(0.27)
z_x			-7.45
			(-0.39)
Constant	4.07	3.60	7.27
	(1.36)	(0.37)	(0.49)
F (2nd stage)	6.69	3.46	3.93
F (1st stage)	12.1	6.46	8.15
Coefficient of z (1st stage)	0.41	0.33	0.25
t-stat of z (1st stage)	3.48	1.19	0.88
R^2 (1st stage)	0.16	0.17	0.17
Observations	43	43	43

Table W6. Fuzzy RDD using only lead underwriters' affiliated allocations.
This table contains the second stage coefficients of a local 2SLS regression of *Underpricing* on two measures of lead managers' affiliated allocations instrumented by *z*, for different values of the bandwidth *h*. The two measures are *AffiliatedAllocPerc* (Panel A) and *AffiliatedAllocDummy* (Panel B). *z* is a dummy variable equal to one if $Age \geq 3$ and zero otherwise, $x = Age - 3$, and $z\_x = z \cdot x$. Relevant statistics from the first stage regression (*F*, coefficient of *z*, t-stat of *z*, and R^2) are also reported. Returns and fractions are expressed as percentages. All non-dummy variables except *Age* are winsorized at the 2.5% level. Heteroschedasticity-robust t-statistics are in parentheses. Significance levels are denoted as: * 0.1, ** 0.05, *** 0.01.

(A)

	(1) h=1	(2) h=2	(3) h=2	(4) h=3	(5) h=3	(6) h=3
AffiliatedAllocPerc	10.9**	15.3***	8.11	20.1***	9.94*	8.53*
	(2.17)	(2.80)	(1.31)	(2.90)	(1.73)	(1.83)
x			2.56		1.91	2.88*
			(1.00)		(1.63)	(1.70)
z_x						-1.79
						(-0.57)
Constant	4.63***	3.74*	7.77**	0.85	5.96**	8.01***
	(2.67)	(1.87)	(2.09)	(0.25)	(2.06)	(2.72)
F (2nd stage)	4.69	7.84	6.28	8.41	9.17	6.81
F (1st stage)	7.18	14.9	7.42	11.6	7.14	8.29
Coefficient of z (1st stage)	0.95	0.74	1.17	0.58	1.05	1.04
t-stat of z (1st stage)	2.68	3.86	1.94	3.41	2.42	2.87
R^2 (1st stage)	0.11	0.061	0.066	0.034	0.040	0.040
Observations	57	130	130	217	217	217

(B)

	(1) h=1	(2) h=2	(3) h=2	(4) h=3	(5) h=3	(6) h=3
AffiliatedAllocDummy	28.9***	35.3***	23.7	37.3***	30.2**	27.3**
	(2.72)	(3.59)	(1.54)	(4.68)	(2.07)	(2.17)
x			1.80		0.72	1.49
			(0.69)		(0.51)	(0.95)
z_x						-1.21
						(-0.47)
Constant	2.15	1.56	5.11	0.44	2.44	4.15
	(0.92)	(0.59)	(1.10)	(0.19)	(0.59)	(1.09)
F (2nd stage)	7.39	12.9	8.25	21.9	12.7	8.90
F (1st stage)	10.2	21.6	10.7	34.3	17.1	11.4
Coefficient of z (1st stage)	0.36	0.32	0.40	0.32	0.34	0.33
t-stat of z (1st stage)	3.19	4.65	2.21	5.86	2.59	2.63
R^2 (1st stage)	0.15	0.11	0.11	0.097	0.097	0.098
Observations	57	130	130	217	217	217

Table W7. Average underpricing by industry and age. This table reports the average underpricing of eligible IPOs for each of the 12 Fama-French industries by age groups.

	$h = 1$		$h = 3$	
	$Age = 2$	$Age = 3$	$Age < 3$	$3 \leq Age < 6$
Consumer NonDurables		32.2		24.1
Consumer Durables				20.6
Manufacturing		-3.1		-3.1
Oil, Gas, and Coal	16.2	16.0	12.8	6.8
Chemicals and Allied Products		7.8	3.9	0.0
Business Equipment – Computers, Software	6.2	26.7	6.2	29.1
Telephone and Television Transmission	6.9		6.9	14.5
Utilities				20.2
Wholesale, Retail, and Some Services				17.7
Healthcare, Medical Equipment, and Drugs	1.6	8.9	10.1	10.0
Finance	3.3	14.9	1.9	18.1
Other	10.8	18.7	1.6	12.6

Table W8. Fuzzy RDD controlling for industry.

This table contains the second stage coefficients of a local 2SLS regression of *Underpricing* on two measures of affiliated allocations instrumented by z, for a bandwidth $h = 1$, controlling for industry dummy variables. The two measures are *AffiliatedAllocPerc* (Panel A) and *AffiliatedAllocDummy* (Panel B). z is a dummy variable equal to one if $Age \geq 3$ and zero otherwise, $x = Age - 3$, and $z\_x = z \cdot x$. Relevant statistics from the first stage regression (F, coefficient of z, t-stat of z, and R^2) are also reported. Returns and fractions are expressed as percentages. All non-dummy variables except *Age* are winsorized at the 2.5% level. Heteroschedasticity-robust t-statistics are in parentheses. Significance levels are denoted as: * 0.1, ** 0.05, *** 0.01.

(A)

	(1) h=1	(2) h=2	(3) h=2	(4) h=3	(5) h=3	(6) h=3
AffiliatedAllocaPerc	7.13**	7.34**	5.98	6.47***	5.61	4.96*
	(2.16)	(2.54)	(1.37)	(2.72)	(1.56)	(1.68)
x			0.90		0.40	1.26
			(0.29)		(0.24)	(0.66)
z_x						-1.36
						(-0.43)
Constant	4.29	11.7*	12.6*	6.04	6.84	8.23
	(1.13)	(1.72)	(1.72)	(0.96)	(1.05)	(1.34)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
F (2nd stage)	1.43	2.13	2.11	2.79	2.77	2.70
F (1st stage)	2.42	4.94	4.13	4.87	4.42	4.73
Coefficient of z (1st stage)	1.39	1.29	1.81	1.41	1.64	1.67
t-stat of z (1st stage)	3.24	5.21	2.21	5.31	2.90	3.45
R^2 (1st stage)	0.27	0.15	0.15	0.11	0.11	0.11
Observations	57	130	130	217	217	217

(B)

	(1) h=1	(2) h=2	(3) h=2	(4) h=3	(5) h=3	(6) h=3
AffiliatedAllocDummy	26.0**	20.3***	25.3	17.3***	23.8*	22.8*
	(2.37)	(2.65)	(1.59)	(3.10)	(1.80)	(1.91)
x			-1.20		-1.13	-0.78
			(-0.32)		(-0.57)	(-0.35)
z_x						-0.46
						(-0.17)
Constant	4.47	7.58	5.36	4.86	2.17	2.83
	(1.27)	(1.27)	(0.59)	(0.82)	(0.27)	(0.37)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
F (2nd stage)	2.03	3.40	3.00	5.52	4.76	4.34
F (1st stage)	24.5	9.45	8.02	12.1	11.5	10.4
Coefficient of z (1st stage)	0.38	0.47	0.43	0.53	0.39	0.36
t-stat of z (1st stage)	3.48	5.93	2.35	8.35	2.94	2.69
R^2 (1st stage)	0.46	0.24	0.24	0.27	0.28	0.28
Observations	57	130	130	217	217	217

Table W9. Average underpricing by sub-period and age. This table reports the average underpricing of eligible IPOs for each sub-period in the sample by age groups.

	$h = 1$		$h = 3$	
	$Age = 2$	$Age = 3$	$Age < 3$	$3 \leq Age < 6$
2001-2002	2.78	28.9	3.90	21.0
2003-2006	8.37	9.75	5.92	15.0
2007-2009	-4.61	7.60	-2.73	8.02
2010-2013	3.54	15.67	3.65	18.0

Table W10. Fuzzy RDD controlling for sub-period fixed effects.
This table contains the second stage coefficients of a local 2SLS regression of *Underpricing* on two measures of affiliated allocations instrumented by *z*, for a bandwidth $h = 1$, controlling for industry dummy variables. The two measures are *AffiliatedAllocPerc* (Panel A) and *AffiliatedAllocDummy* (Panel B). *z* is a dummy variable equal to one if $Age \geq 3$ and zero otherwise, $x = Age-3$, and $z\_x = z \cdot x$. Relevant statistics from the first stage regression (*F*, coefficient of *z*, t-stat of *z*, and R^2) are also reported. Returns and fractions are expressed as percentages. All non-dummy variables except *Age* are winsorized at the 2.5% level. Heteroschedasticity-robust t-statistics are in parentheses. Significance levels are denoted as: * 0.1, ** 0.05, *** 0.01.

(A)

	(1) h=1	(2) h=2	(3) h=2	(4) h=3	(5) h=3	(6) h=3
AffiliatedAllocPerc	6.85**	8.29***	4.42	9.98***	6.65	5.57*
	(2.16)	(2.94)	(0.93)	(3.26)	(1.64)	(1.77)
x			2.65		1.32	2.51
			(0.76)		(0.81)	(1.32)
z_x						-1.92
						(-0.60)
Constant	13.2*	11.8**	14.9**	3.12	7.30	9.95**
	(1.89)	(2.03)	(2.51)	(0.39)	(1.17)	(2.09)
F (2nd stage)	2.42	4.23	4.44	5.34	5.41	4.83
F (1st stage)	2.88	6.45	5.16	8.92	7.24	7.20
Coefficient of z (1st stage)	1.38	1.37	1.48	1.22	1.46	1.49
t-stat of z (1st stage)	3.22	4.51	1.96	4.22	2.52	3.12
R^2 (1st stage)	0.18	0.12	0.12	0.086	0.087	0.087
Observations	57	130	130	217	217	217

(B)

	(1) h=1	(2) h=2	(3) h=2	(4) h=3	(5) h=3	(6) h=3
AffiliatedAllocDummy	23.4**	27.4***	15.5	27.5***	27.6*	23.7**
	(2.52)	(3.71)	(1.04)	(5.15)	(1.92)	(2.03)
x			2.46		-0.017	1.20
			(0.76)		(-0.01)	(0.67)
z_x						-1.65
						(-0.65)
Constant	10.3	9.25	13.2**	4.22	4.17	6.89
	(1.48)	(1.63)	(2.04)	(0.90)	(0.64)	(1.26)
F (2nd stage)	2.66	5.50	5.53	8.15	6.61	5.94
F (1st stage)	4.97	7.55	6.02	14.2	11.5	9.70
Coefficient of z (1st stage)	0.40	0.42	0.42	0.44	0.35	0.35
t-stat of z (1st stage)	3.50	5.31	2.23	7.00	2.59	2.68
R^2 (1st stage)	0.21	0.17	0.17	0.17	0.17	0.17
Observations	57	130	130	217	217	217

Table W11. Fuzzy RDD with different winsorization thresholds.
This table contains the second stage coefficients of a local 2SLS regression of *Underpricing* on two measures of affiliated allocations instrumented by z, for a bandwidth $h = 3$ and different winsorization thresholds. The two measures are *AffiliatedAllocPerc* and *AffiliatedAllocDummy*. z is a dummy variable equal to one if $Age \geq 3$ and zero otherwise, $x = Age - 3$, and $z\_x = z \cdot x$. Relevant statistics from the first stage regression (F, coefficient of z, t-stat of z, and R^2) are also reported. Returns and fractions are expressed as percentages. All non-dummy variables except *Age* are winsorized at the 0.5% level in Columns (1)-(2), 1% level in Columns (3)-(4), and 5% level in Columns (5)-(6). Heteroschedasticity-robust t-statistics are in parentheses. Significance levels are denoted as: * 0.1, ** 0.05, *** 0.01.

	Winsorized 0.5%		Winsorized 1%		Winsorized 5%	
	(1)	(2)	(3)	(4)	(5)	(6)
AffiliatedAllocPerc	4.05*		4.13*		6.09**	
	(1.68)		(1.69)		(2.00)	
AffiliatedAllocDummy		22.6**		22.6**		23.6**
		(1.98)		(1.98)		(2.19)
x	2.87*	1.45	2.89*	1.45	2.47*	1.24
	(1.95)	(0.94)	(1.95)	(0.94)	(1.70)	(0.80)
z_x	-2.05	-1.89	-2.04	-1.89	-2.35	-2.18
	(-0.66)	(-0.76)	(-0.66)	(-0.76)	(-0.86)	(-0.92)
Constant	8.59***	4.07	8.60***	4.07	7.24***	3.14
	(3.20)	(1.01)	(3.20)	(1.01)	(2.66)	(0.80)
F (2nd stage)	6.79	8.99	6.89	9.01	8.44	10.3
F (1st stage)	10.3	18.6	10.9	18.6	16.2	18.9
Coefficient of z (1st stage)	1.96	0.35	1.92	0.35	1.39	0.36
t-stat of z (1st stage)	2.93	2.61	3.00	2.61	3.62	2.71
R^2 (1st stage)	0.049	0.16	0.052	0.16	0.082	0.16
Observations	217	217	217	217	217	217

Table W12. Fuzzy RDD excluding IPOs with uncertainty around their non-compliance.
This table contains the second stage coefficients of a local 2SLS regression of *Underpricing* on two measures of affiliated allocations instrumented by z, for different values of the bandwidth h. The two measures are *AffiliatedAllocPerc* (Panel A) and *AffiliatedAllocDummy* (Panel B). z is a dummy variable equal to one if $Age \geq 3$ and zero otherwise, $x = Age - 3$, and $z\_x = z \cdot x$. Relevant statistics from the first stage regression (F, coefficient of z, t-stat of z, and R^2) are also reported. Returns and fractions are expressed as percentages. All non-dummy variables except *Age* are winsorized at the 2.5% level. Heteroschedasticity-robust t-statistics are in parentheses. Significance levels are denoted as: * 0.1, ** 0.05, *** 0.01. Eight IPOs with uncertainty around their non-compliance with Rule 10(f)-3 are excluded from the sample.

(A)

	(1) h=1	(2) h=2	(3) h=2	(4) h=3	(5) h=3	(6) h=3
AffiliatedAllocPerc	7.64**	9.11***	6.40	9.48***	7.78*	7.92**
	(2.57)	(3.36)	(1.56)	(4.52)	(1.91)	(2.44)
x			1.82		0.73	0.57
			(0.62)		(0.44)	(0.42)
z_x						0.25
						(0.08)
Constant	2.94*	3.24	5.83	2.77*	4.16	3.86
	(1.93)	(1.61)	(1.47)	(1.77)	(1.24)	(1.44)
F (2nd stage)	6.62	11.3	7.25	20.4	11.5	7.59
F (1st stage)	12.0	29.5	14.7	55.4	27.7	.
Coefficient of z (1st stage)	1.66	1.38	1.98	1.36	1.63	1.52
t-stat of z (1st stage)	3.46	5.44	2.32	7.45	2.69	3.91
R^2 (1st stage)	0.15	0.10	0.11	0.091	0.092	0.093
Observations	53	124	124	209	209	209

(B)

	(1) h=1	(2) h=2	(3) h=2	(4) h=3	(5) h=3	(6) h=3
AffiliatedAllocDummy	22.4***	24.1***	20.5*	23.3***	25.3**	22.9***
	(3.32)	(4.15)	(1.89)	(5.75)	(2.46)	(2.95)
x			0.90		-0.34	0.57
			(0.31)		(-0.21)	(0.42)
z_x						-1.27
						(-0.51)
Constant	2.94*	3.24	4.51	2.77*	2.12	3.86
	(1.93)	(1.61)	(1.15)	(1.77)	(0.62)	(1.44)
F (2nd stage)	11.0	17.2	9.62	33.1	16.3	11.1
F (1st stage)	37.8	90.9	45.3	186.0	92.6	.
Coefficient of z (1st stage)	0.57	0.52	0.62	0.55	0.50	0.52
t-stat of z (1st stage)	6.14	9.53	3.70	13.6	4.10	6.70
R^2 (1st stage)	0.36	0.26	0.26	0.25	0.25	0.25
Observations	53	124	124	209	209	209

Table W13. OLS regression of underpricing on affiliated allocations (March, June, September, and December). This table contains the coefficient estimates from several specifications of an OLS regression of *Underpricing* on two measures of affiliated allocations: a dummy variable that identifies IPOs with affiliated allocations (columns 1-5) and the percentage of the issue allocated to affiliated funds (columns 6-10). The sample includes 352 eligible IPOs in the period 2001-2013 issued in March, June, September, or December. Columns 2, 3, 7 and 8 introduce IPO level control variables, as defined in Table 1 of the paper. Columns 4 and 9 introduce year and industry fixed effects. Columns 5 and 10 introduce lead underwriters' control variables. Returns and fractions are expressed as percentages. All non-dummy variables except *Age* are winsorized at the 2.5% level. Robust t-statistics are in parentheses. Significance levels are denoted as: * 0.1, ** 0.05, *** 0.01.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
AffiliatedAllocDummy	11.6***	7.21***	6.33***	5.64**	5.30**					
	(5.92)	(3.55)	(2.84)	(2.52)	(2.16)					
AffiliatedAllocPerc						1.19**	0.87*	0.93*	0.70	0.76
						(2.20)	(1.68)	(1.66)	(1.14)	(1.15)
IndependentAllocPerc	0.26***	0.22***	0.21**	0.18**	0.14*	0.34***	0.25***	0.23***	0.20**	0.16*
	(2.93)	(2.67)	(2.58)	(2.37)	(1.72)	(3.69)	(2.96)	(2.83)	(2.58)	(1.92)
ln(Age+1)		-2.00*	-1.57	-1.46	-0.60		-2.10**	-1.67	-1.53	-0.67
		(-1.95)	(-1.52)	(-1.29)	(-0.51)		(-2.06)	(-1.62)	(-1.35)	(-0.55)
ln(Assets)		-2.15***	-0.43	-0.41	-0.73		-2.06***	-0.50	-0.45	-0.83
		(-3.11)	(-0.42)	(-0.40)	(-0.66)		(-2.81)	(-0.48)	(-0.43)	(-0.74)
Adjustment		0.58***	0.55***	0.49***	0.49***		0.66***	0.59***	0.53***	0.52***
		(7.81)	(6.97)	(5.87)	(5.63)		(9.07)	(7.65)	(6.41)	(6.06)
OnlyPrimaryShares		-1.10	-1.80	-1.03	-0.88		-1.80	-2.29	-1.47	-1.31
		(-0.59)	(-0.99)	(-0.55)	(-0.42)		(-0.98)	(-1.28)	(-0.79)	(-0.64)
Nasdaq		-0.0046	-0.60	0.48	0.63		-0.79	-0.97	0.14	0.24
		(-0.00)	(-0.26)	(0.19)	(0.23)		(-0.33)	(-0.42)	(0.06)	(0.09)
Foreign		2.97	3.67	3.18	1.88		2.44	3.24	2.76	1.37
		(1.02)	(1.27)	(1.04)	(0.57)		(0.81)	(1.09)	(0.88)	(0.41)
ln(Proceeds)			-0.25	0.12	-0.72			0.32	0.86	-0.14
			(-0.12)	(0.05)	(-0.31)			(0.16)	(0.41)	(-0.06)
VentureCapitalBack			4.91*	5.89**	4.98*			4.69*	5.78**	5.00*
			(1.93)	(2.20)	(1.70)			(1.85)	(2.17)	(1.73)
LengthIPOprocess			-0.32	-0.52**	-0.55**			-0.36	-0.56**	-0.59***
			(-1.43)	(-2.38)	(-2.51)			(-1.62)	(-2.53)	(-2.69)
HighRankDummy			1.82	1.63	3.48			2.73	2.33	4.18
			(0.69)	(0.59)	(0.94)			(1.01)	(0.83)	(1.11)
NumberLeadManagers			-0.37	-1.51**	-1.84			-0.40	-1.44**	-1.99
			(-0.61)	(-2.02)	(-0.67)			(-0.70)	(-1.98)	(-0.74)
NumberSyndicateMembers			0.087	0.37	0.27			0.11	0.35	0.25
			(0.32)	(1.25)	(0.85)			(0.38)	(1.14)	(0.75)
GrossSpread			3.91***	3.93**	3.59*			4.76***	4.66***	4.22**
			(2.69)	(2.32)	(1.73)			(3.37)	(2.83)	(2.10)
Constant	4.03***	24.6***	-11.3	-3.11	4.79	7.61***	27.6***	-17.1	-9.63	-0.46
	(2.61)	(4.34)	(-0.69)	(-0.17)	(0.23)	(4.78)	(4.87)	(-1.10)	(-0.54)	(-0.02)
industry FE	No	No	No	Yes	Yes	No	No	No	Yes	Yes
year FE	No	No	No	Yes	Yes	No	No	No	Yes	Yes
underwriter FE	No	No	No	No	Yes	No	No	No	No	Yes
R^2	0.127	0.333	0.362	0.427	0.489	0.062	0.318	0.355	0.421	0.485
F	25.4	18.8	11.9	7.59	4.97	9.44	17.3	11.5	6.80	5.11
Observations	352	352	352	352	352	352	352	352	352	352

Figure W1. Equilibrium outcomes when the underwriter cannot allocate IPO shares to affiliated funds.

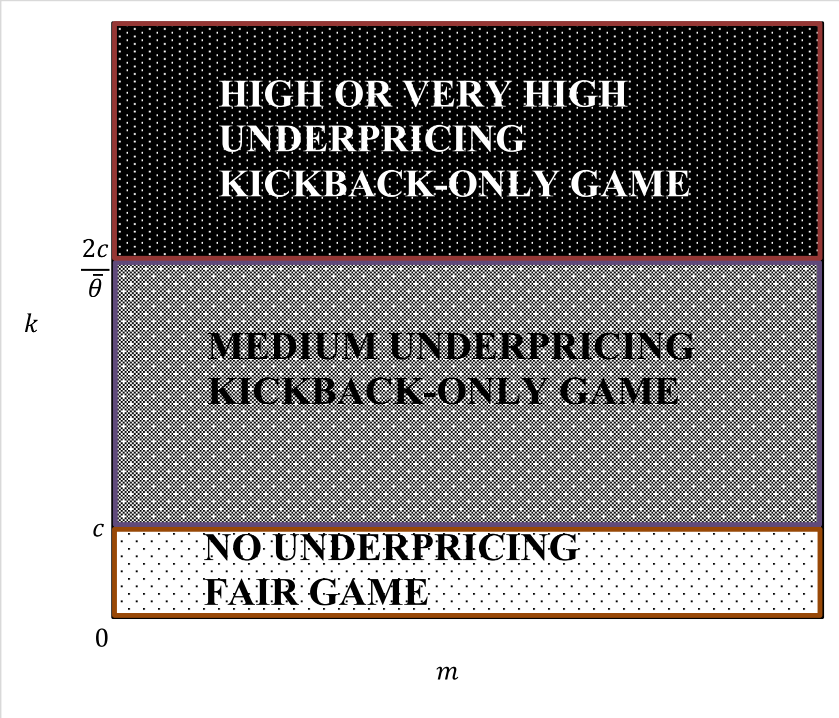


Figure W2. Equilibrium outcomes when the underwriter can allocate IPO shares to affiliated funds and the reservation price of the IPO firm is relatively low.

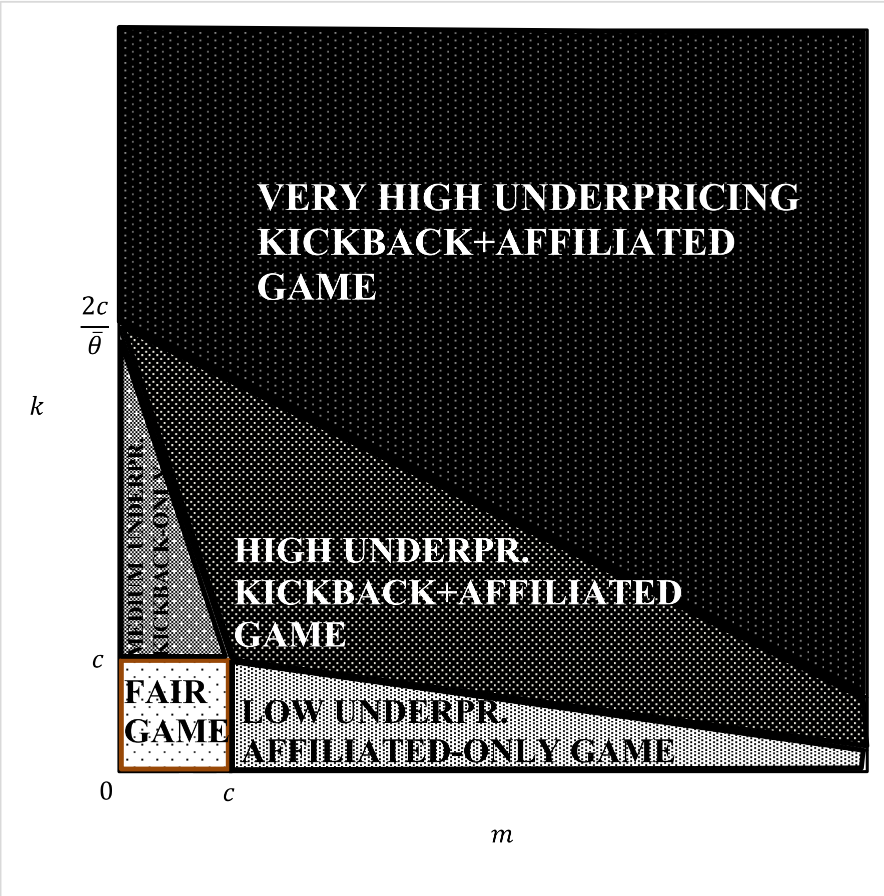


Figure W3. Equilibrium outcomes when the underwriter can allocate IPO shares to affiliated funds and the reservation price of the IPO firm is relatively high.

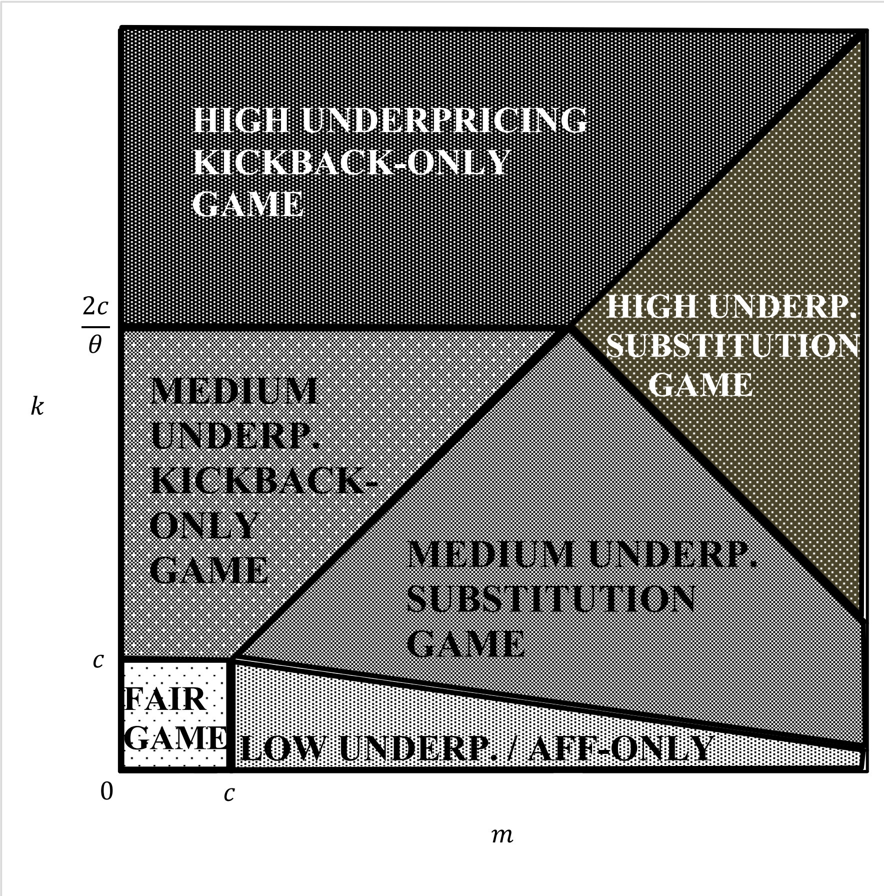
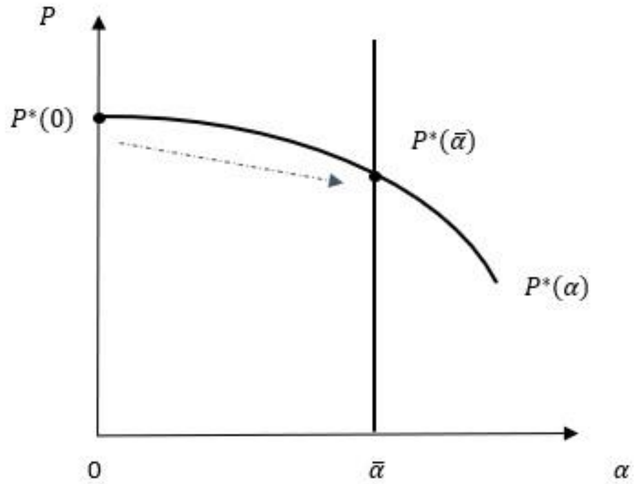


Figure W4. Identification strategy. This figure visualizes an intuitive representation of our identification strategy, where $\boldsymbol{P}$ is the IPO price and $\boldsymbol{\alpha}$ is the percentage allocation to affiliated funds.



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