ESSAYS IN CORPORATE FINANCE

By

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To my parents

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ESSAYS IN CORPORATE FINANCE

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The first study examines the economic consequences of IPO spinning using a sample of 56 companies going public in 1996-2000 in which top executives received allocations of other hot initial public offerings (IPOs) from the bookrunner. The 56 IPOs had first-day returns that were, on average, 23% higher than similar IPOs. The profits collected by these executives were only a small fraction of the incremental amount of money left on the table by their companies when they went public. These companies were dramatically less likely to switch investment bankers in a follow-on offer: only 6% of issuers whose executives were spun switched underwriters, whereas 31% of other issuers switched. These findings suggest that the spinning of executives accomplished its goal of affecting corporate decisions. The second study develops a theory of initial public offering underpricing based on differentiated underwriting services and localized competition. Even though a large number of investment banks compete for IPOs, if issuers care about non-price dimensions of underwriting, then the industry structure is best characterized as a series of local oligopolies. Model implications are tested on all-star analyst coverage, industry expertise, and other non-price dimensions.

CHAPTER 1
THE ECONOMIC CONSEQUENCES OF IPO SPINNING

Motivation

Spinning is the allocation by underwriters of the shares of hot initial public offerings (IPOs) to company executives in order to influence their decisions in the hiring of investment bankers and/or the pricing of their own company's IPO. The term "spinning" refers to the fact that the shares are often immediately sold in the aftermarket, or "spun," for a quick profit, and an IPO is termed "hot" if it is expected to jump in price as soon as it starts trading.

IPO spinning is one of the four scandals associated with IPOs that have been the subject of regulatory settlements following the collapse of the technology stock bubble of 1999-2000.[1] The other three practices, laddering, analyst conflicts of interest, and the exchange of soft dollar commission business in return for IPO allocations, are examined either theoretically or empirically by Hao (2007), Cliff and Dennis (2004), and Reuter (2006), respectively. Although spinning has attracted much regulatory and legal attention, resulting in large settlements and the prosecution of several executives, the effect of spinning on corporate actions has not been examined in a systematic manner because of the lack of publicly available data on which executives were being spun. Only Loughran and Ritter (2004) discuss spinning in the academic financial literature, although Maynard (2002) and Griffin (2004) discuss the legal issues.

In the IPO literature, the issue of IPO underpricing and its time-series variation is of considerable interest. In particular, the average first day return of U.S. IPOs increased from 7% in 1980-1989 to 15% in 1990-1998 and then exploded to more than 65% in the 1999-2000

[1] See, e.g., the October 1, 2003 JP Morgan settlement with the SEC over laddering at http://www.sec.gov/litigation/litreleases/lr18385.htm. See the January 9, 2003 NASD settlement with Robertson Stephens for trading IPO allocations for commissions at http://www.finra.org/Newsroom/NewsReleases/2003/P002957. Also see the 'Global Settlement' joint press release on April 28, 2003 for settlement details regarding IPO spinning and analyst conflicts of interest at http://www.sec.gov/news/press/2003-54.htm.

bubble period, before falling back to 12% in 2001-2008. This variation has been the subject of study in Loughran and Ritter (2004), who propose a changing issuer objective function hypothesis, which consists of two parts. The first part, the analyst lust hypothesis, has been tested and confirmed by Cliff and Dennis (2004). However, the second part, the spinning hypothesis, has not been tested empirically, mainly due to the lack of data.

In this paper, we fill this void. For our empirical analysis, we use data gathered from court cases, the media, and documents requested through the Freedom of Information Act. From these sources, we obtain data on 146 officers and directors at 56 companies that were recipients of hot IPO allocations. All of these companies were taken public by Deutsche Morgan Grenfell (DMG), Credit Suisse First Boston (CSFB), and Salomon Smith Barney (SSB) in 1996-2000.

There is evidence in Securities and Exchange Commission (SEC) settlements and Congressional testimony that Piper Jaffray, Goldman Sachs, and other investment banking firms also engaged in spinning.[2] Our empirical analysis, however, is restricted to IPOs for which DMG, CSFB, or SSB was the bookrunner.[3] The reason that we impose this restriction is that the companies identified in press reports and settlements suffer from a selection bias, frequently containing examples of prominent executives at well-known companies. In contrast, the data for the three investment banking firms that we focus on is systematic, composed of all of the executives who were being systematically spun by CSFB as of March 21, 2000; executives who

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[2] See Randall Smith, "Goldman Gave Hot IPO Shares to Top Executives of Its Clients," *Wall Street Journal*, Oct. 3, 2002. Also see the July 12, 2004 National Association of Securities Dealers **(**NASD**)** press release at http://www.finra.org/PressRoom/NewsReleases/2004NewsReleases/index.htm regarding Piper Jaffray's settlement with the NASD.

[3] Frank Quattrone, an investment banker associated with "Friend of Frank" brokerage accounts for the spinning of corporate executives, was head of technology investment banking at DMG from mid-1996 to June 30, 1998, and then head of technology investment banking at CSFB from mid-1998 until his forced resignation in 2003. Consequently, we restrict our sample to tech IPOs at DMG from July 1, 1996 to June 30, 1998; tech IPOs at CSFB from July 1, 1998 to December 31, 2000, and all IPOs at Smith Barney from July 1, 1997 and Salomon Brothers from January 1, 1996 until their merger at the end of 1997, and then SSB until December 31, 2000.

were being spun by CSFB and lived in Silicon Valley, including those being spun after March 21, 2000; or those being spun by SSB at any time in 1996-2000. For each executive that had a brokerage account with the SSB unit in charge of spinning, we have data on the allocations to each executive for 48 IPOs.

We estimate the effect of spinning on IPO underpricing and the awarding of future investment banking mandates. The effect of spinning on IPO underpricing is a direct test of Loughran and Ritter's (2004) spinning hypothesis, which states that executives who receive side payments from underwriters, in the form of shares in other companies that are going public, put less emphasis on maximizing the proceeds from their own IPO, resulting in the IPO being more underpriced. We find that holding everything else constant, IPOs in which the executives are being spun are 23% more underpriced (e.g., 43% vs. 20%). The average dollar value of this incremental underpricing, the incremental money left on the table, is approximately $17 million, where money left on the table is the underpricing per share multiplied by the number of shares issued. The average first-day profit received from hot IPO allocations by the executives of a company being spun is $1.3 million. The ratio of these numbers indicates that only 8% of the incremental amount of money left on the table flows back to the executives being spun.

The effect of spinning on subsequent investment banking mandates relates to the literature that asks why firms do or do not switch underwriters (e.g., Dunbar, 2000; Krigman, Shaw, and Womack, 2001; Burch, Nanda, and Warther, 2005; and Ljungqvist, Marston, and Wilhelm, 2006, 2009). This literature has focused on performance dissatisfaction, graduation to a more prestigious underwriter, and analyst coverage reasons as factors that affect switching decisions. We add another reason, the co-opting of executive decision-makers, to this list. We find that companies with executives who are being spun are dramatically less likely to switch underwriters for their first seasoned equity offering. For companies not being spun, the probability of switching underwriters is 31%. For companies being spun, the probability of switching is only 6%.

More generally, this paper presents evidence on the economic consequences of an agency problem arising from the delegation of decision-making to corporate managers. Rarely, however, are there direct measures of the benefits received by executives and the costs imposed on other shareholders as a result of actions that provide personal benefits to top executives. In this paper, we are able to calculate the costs and benefits of spinning.

Background and Hypothesis Development

Although spinning first attracted public attention following the disclosure of the practice by Siconolfi (1997) in a *Wall Street Journal* article, it was not a new practice. As Siconolfi's article discusses, allocating hot IPOs to corporate executives, many of whom are wealthy individuals, had occurred for many years. During the late 1990s, however, receiving hot IPO allocations became more lucrative as more and more IPOs were severely underpriced. In 1999-2000, the average first-day return reached 65%. In these two years, a total of $68 billion was left on the table by IPOs (Loughran and Ritter, 2004). As any economist would predict, rent-seeking activity flourished. Spinning eventually caught the attention of regulatory agencies.

The 2003 Global Settlement, in which 10 investment banks agreed to pay $1.4 billion in fines, restitution, and subsidization of independent research, states that CSFB and SSB engaged in inappropriate hot IPO allocations.[4] The Global Settlement included a voluntary ban on the allocation of hot IPOs to executive officers and directors of public companies, which has

[4] See the SEC press release from April 28, 2003 at www.sec.gov/news/press/2003-54.htm regarding CSFB and SSB's settlements. The Global Settlement between the SEC, NASD, NYSE, and various states, and 10 (subsequently 12) major investment banking firms involved fines, restitution, and payments for independent research, as well as commitments to change many industry practices regarding biased analyst research and IPO allocations.

subsequently been incorporated into the proposed NASD Rule 2712.[5] As for the recipients of spinning shares, the New York State Attorney General prosecuted five executives of telecommunication (telecom) companies, including Philip F. Anschutz, the founder of Qwest Communications International Inc., who agreed to pay $4.4 million to charities and educational institutions for allegedly profiting from IPO spinning.[6] Another Qwest executive, Executive Vice President Marc Weisberg, agreed to plead guilty in 2005 to criminal charges regarding the undisclosed receipt of hot IPO shares.[7]

With bookbuilt IPOs, if there is excess demand at the offer price the bookrunner has discretion in the allocation of shares.[8] Although there are typically discussions of an expected offer price at the time that an issuing firm chooses a lead underwriter, the final offer price is not set until the pricing meeting, which typically occurs the afternoon before trading commences. From an underwriter's point of view, the determination of the final offer price is based on the

[5] In the August 2002 *Notice to Members 02-55*, the National Association of Securities Dealers (NASD), one of the predecessors of the Financial Industry Regulatory Authority (FINRA), proposed Rule 2712 and the amendment of existing Rule 2710 to "prohibit certain IPO allocation abuses." Specifically, "Rule 2712(c) would expressly prohibit a member and its associated persons from allocating IPO shares to an executive or director of a company on the condition that the executive officer or director, on behalf of the company, direct future investment banking business to the member. The rule also would prohibit IPO allocations to an executive officer or director as consideration for directing investment banking services previously rendered by the member to the company. …NASD also is proposing to amend Rule 2710, the Corporate Financing Rule, to require that members file information regarding the allocation of IPO shares to executive officers and directors of a company that hires a member to be the book-running managing underwriter of the company's IPO."

[6] The five telecom executives who were originally charged are Philip F. Anschutz, Bernard J. Ebbers, Stephen A. Garofalo, Clark E. McLeod, and Joseph P. Nacchio. All five executives settled.

[7] On December 28, 2005, Weisberg pled guilty to one count of wire fraud. He was subsequently sentenced to 60 days house arrest and two years probation, and fined $250,000. He also agreed to cooperate with prosecutors in the insider trading prosecution of former Qwest CEO Joseph Nacchio, who was subsequently convicted on insider trading charges. Weisberg's case is unusual in that he went out of his way to solicit IPO allocations for his personal account, and did not disclose his actions to other Qwest executives, even when explicitly questioned.

[8] All bookrunners are lead underwriters, but not all lead underwriters are bookrunners. During our sample period, the vast majority of IPOs had a sole lead underwriter, which was also the bookrunner. The bookrunner is in charge of allocating shares, especially to institutional investors, although some of this activity may be delegated to the other underwriters in a syndicate. We use the term underwriter and bookrunner interchangeably in much of the paper, although in our empirical work we assume that only bookrunners have allocation and pricing authority.

competition between two opposing forces. On the one hand, underwriters prefer a high offer price because it yields higher gross spread revenue.[9] On the other hand, a low offer price reduces the risk of an unsuccessful placement. More importantly, underwriters can allocate these underpriced shares to investors in exchange for commission business, to executives to sway their decision in choosing which investment banking firm to hire, or the shares can be allocated by the firm itself through a "friends and family" program.

When shares are allocated to executives for spinning or to individuals through a friends and family program, there is an opportunity cost to the underwriter because it does not have the ability to collect soft dollars in return for underpriced IPO allocations. (Soft dollars are the commissions paid by institutional investors that are in excess of direct execution costs.) These soft dollars, paid by rent-seeking institutional investors, create an incentive for the underwriter to underprice IPOs, and to attract IPOs that will be severely underpriced (e.g., Fulghieri and Spiegel, 1993; Loughran and Ritter, 2002). Attracting underpriced IPOs is one of the reasons that underwriters are willing to incur the opportunity cost of allocating some IPO shares for spinning and friends and family programs.

Theoretical models of IPO underpricing can be categorized on the basis of whether or not there is an agency problem between issuers and underwriters. Non-agency theories explain IPO underpricing using a framework whereby investors have to be convinced to buy IPOs by being given an inducement in the form of underpriced shares. Agency theories, in contrast, assume that there is more underpricing than necessary to induce investors to purchase IPOs. Baron and Holmstrom (1980), Baron (1982), Loughran and Ritter (2002, 2004), and Ljungqvist and

[9] The gross spread is the fee that investment bankers receive on securities offerings. During our sample period, over 90% of moderate-size IPOs had a gross spread of exactly 7%, suggesting that the percentage spread is not an important choice variable for the issuer. For a $10 offer price with a 7% gross spread, the issuing firm would receive net proceeds per share of $9.30, and investment bankers would receive underwriting revenue of $0.70.

Wilhelm (2003) all argue that underwriters want to underprice IPOs. These theories, however, do not explain why issuing firms would hire an underwriter that has a reputation for ex post taking advantage of its informational advantage or its bargaining power at the pricing meeting, with one exception.

Loughran and Ritter (2004) provide an explanation for why issuing companies would hire an underwriter that is expected to leave more money on the table than necessary to complete the IPO. They posit that the issuer's objective function has three components:

$$\alpha_1 \cdot \text{IPO Proceeds} + \alpha_2 \cdot \text{Proceeds from Future Sales} + \alpha_3 \cdot \text{Side Payments}, \tag{1-1}$$

where $\alpha_1 + \alpha_2 + \alpha_3 = 1$. They assume that the proceeds from future sales are boosted by bullish coverage from influential analysts.

Side payments in the form of allocations of other IPOs create an incentive for issuers to seek, rather than avoid, underwriters with a reputation for severe underpricing. The more hot IPOs that are being underwritten by a given investment banker, the more are the number of shares available to allocate to the executives being spun. This logic would predict that issuers would also seek out underwriters with a large market share, resulting in "the rich getting richer." Consistent with the desire of issuers whose executives are being spun to seek an underwriter with many underpriced IPOs to allocate, Hoberg (2007) documents persistent patterns with some underwriters having more underpricing than others, and with these high underpricing underwriters gaining market share.

Most of the IPO literature has implicitly or explicitly assumed that the first term in Equation 1-1 is the only term that enters the objective function of issuers. If the issuing firm's executives are less concerned with maximizing IPO proceeds, however, greater underpricing will result. Loughran and Ritter (2004) argue that the second term (the analyst lust hypothesis) and the third term (the spinning hypothesis) are relevant at least some of the time, and that α_2 and α_3 were positive in the 1990s and especially during the bubble period years of 1999 and 2000. They posit that underwriters bundle analyst coverage with IPO underwriting, and that buy recommendations from influential analysts can affect the expected proceeds from future sales. Future sales include both follow-on offers and open-market sales by shareholders.

The arguments for why analyst lust and spinning lead to greater underpricing are similar to the Ljungqvist and Wilhelm (2003) argument for why friends and family programs lead to greater underpricing: the issuing firm's executives are less concerned with maximizing IPO proceeds (or the IPO offer price) than if that was their sole focus. Ljungqvist and Wilhelm posit that friends and family programs create an incentive for issuing firm executives to accept more underpricing, because they do not want to disappoint the people that are receiving these share allocations.

The analyst lust hypothesis has been tested by Cliff and Denis (2004), who examine the effect of all-star analyst coverage on IPO underpricing. Consistent with the Cliff and Denis results for 1993-2000, our regression results indicate that coverage by an all-star analyst employed by the IPO's bookrunner is associated with 15% more underpricing for IPOs in 1996-2000. In addition, Dunbar (2000) and Clarke, Khorana, Patel, and Rau (2007) examine the effect of all-stars on underwriter market share, and find that having an all-star analyst boosts the investment bank's market share in the relevant industry.

Unlike the analyst lust hypothesis, there has been no direct test of the spinning hypothesis. If the bookrunner is being chosen partly on the basis of side payments to executives, the issuer will place less emphasis on receiving the highest possible offer price. Thus, our first testable hypothesis:

- **H1:** Spinning's Effect on IPO Underpricing: Since issuing company executives are less likely to maximize IPO proceeds if they receive personal benefits, a firm whose decision-makers receive hot IPO allocations from an underwriter will have its IPO underpriced more, ceteris paribus.

It is worth noting that in the survey of 336 CFOs who attempted to take their companies public in 2000-2002, Brau and Fawcett (2006) report in their Table IV that 8.5% of CFOs considered the underwriter's reputation for spinning as an important consideration in selecting a lead underwriter. Also, 6% of respondents in their Table V were of the opinion that the underpricing of their IPO was affected by the desire of underwriters to make spinning possible.

Spinning may be used by the underwriter to acquire IPO mandates and influence IPO pricing, but it can also be used as part of a long-term business strategy with a given company to attract future investment banking mandates. As stated in the documents that we quote in Section 2 concerning the underwriter's motivation for spinning, underwriters want executives to steer future investment banking business to them and the underwriters considered ways to reduce or eliminate IPO allocations to executives who changed employment or are no longer influential. This suggests that companies whose executives are receiving hot IPO allocations from a given underwriter are more likely to hire this underwriter in future deals, leading to our second testable hypothesis:

- **H2**: Spinning's Effect on Investment Banking Mandates: Firms whose decision-makers receive hot IPO allocations from an underwriter are more likely to use this underwriter for the next investment banking transaction than they otherwise would, ceteris paribus.

The tests of these two hypotheses are carried out in subsequent sections.

Documents Concerning the Motivation for Spinning by Underwriters

Spinning at DMG and CSFB

Perhaps the most egregious spinning was that done by Frank Quattrone, the head of technology investment banking at Deutsche Morgan Grenfell (DMG) from mid-1996 to mid-

1998, and then the head of technology investment banking at Credit Suisse First Boston (CSFB) from mid-1998 until his forced resignation on March 4, 2003. When Quattrone left DMG, almost all of the employees reporting to him also moved to CSFB. Indeed, the exodus was so total that DMG was left with an empty office building in Silicon Valley, which DMG promptly subleased to CSFB. As a result, the employees who switched employers were able to continue working without even having to move their desks (Elkind and Gimein, 2001).

At CSFB, Quattrone was the Managing Director of the Technology Group's Investment Banking Division. When Quattrone was hired, CSFB set up an organizational structure in which Technology equity research, Technology Private Client Services (brokerage for high net worth individuals), and Technology corporate finance (investment banking) all reported directly to him. Beginning in March 1999, he established formal "Friend of Frank" accounts for individuals that he wanted to influence. As stated in a 2003 NASD regulatory settlement with CSFB:[10]

> Quattrone established the Technology PCS (Private Client Services) Group to be part of the Technology Group. The Director of Technology PCS had a primary and direct reporting responsibility to Quattrone… Technology PCS focused exclusively on the technology sector. Technology PCS operated independently of CSFB's other PCS brokers. The Technology PCS client base consisted, almost exclusively, of officers of investment banking clients of the Technology Group.
>
> From approximately March 1999 through April 2001, Technology PCS improperly allocated "hot" IPO stock to executives of investment banking clients and improperly managed the purchase and sale of that stock through discretionary trading accounts. CSFB's Technology Group gave improper preferential treatment to these company executives with the belief and expectation that the executives would steer investment banking business for their companies to CSFB…
>
> Pitchbooks used by the Technology Group to win an issuer's investment banking business referenced the discretionary accounts. Consistent with those references and representations made at "pitches," an issuer had to award CSFB its investment banking mandate before the issuer's officers were afforded the opportunity to open

[10] See Section 5 of the NASD Letter of Acceptance, Waiver, and Consent (AWC) No. CAF030026 between the NASD and CSFB on April 21, 2003. The AWC states that "CSFB hereby accepts and consents, without admitting or denying the allegations and findings, …the following findings by NASD". The AWC can be found at http://www.finra.org/web/groups/enforcement/documents/enforcement/p007670.pdf

> discretionary accounts and given access to IPO shares by CSFB. Likewise, CSFB considered ways to reduce or eliminate IPO allocations to executives who changed employment and were no longer affiliated with those companies.
>
> Once Technology Group received a mandate, Technology PCS established discretionary accounts for executives who were considered to be "strategic." "Strategic" was commonly understood by Quattrone and Technology PCS managers to refer to the overall business relationship CSFB had with the issuer, including potential future investment banking business. The head of Technology PCS defined "strategic" as "senior decision makers" at existing or prospective investment banking clients of the Technology Group who could influence their companies' choice of investment banker.
>
> Technology PCS did not apply standard CSFB qualification standards (i.e. assets under management, trading revenue production, length of the brokerage relationship, etc.) for the opening of these discretionary accounts. Instead, the decision was based largely on the executive's position and influence in the company…. These discretionary accounts were limited to the purchase and sale of stock purchased through CSFB IPOs. The account holders were not permitted to buy or sell other securities in these accounts.
>
> …In some cases, all the shares allocated to discretionary accounts were sold for a profit on the IPO's first day of trading in the secondary market.

Spinning at SSB

Salomon Smith Barney (SSB) spun corporate executives as part of a strategy for attracting and retaining investment banking business from their companies. Internal SSB documents repeatedly state or imply that company executives should be given preferential treatment in their personal finances because these executives have the power to direct corporate business to SSB. For example, the July 10, 1997 memo from internal auditor Bob Zinnel to Howard Kerbel at Salomon Brothers states:[11]

> Most of PWMG's [Private Wealth Management Group's] clients have been brought into the Firm through Investment Banking relationships. In many respects, PWMG acts as a conduit in keeping client relationships alive which also helps to bring in more business to the Investment Bank.

[11] Exhibit 17 of *Exhibits to Plaintiffs' Statement of Material Undisputed Facts* in *State of New York and Eliot Spitzer, Attorney General of the State of New York, for and on Behalf of the People of the State of New York vs. Bernard J. Ebbers and Clark E. McLeod, Defendants.*

The most infamous executive that SSB spun was Bernie Ebbers, the former CEO of WorldCom, who is currently serving 25 years in a federal prison for securities fraud. Ebbers and WorldCom are not in our sample because the predecessor company of WorldCom, LDDS, had gone public before our sample period starts in 1996. LDDS became public in 1989 through a reverse merger with a publicly traded company, Advantage Companies, Inc. Ebbers received allocations of 21 IPOs from SSB in 1996-2001, with first-day profits of $5,603,665. During this time period, WorldCom generated $115,488,000 in investment banking fees for SSB.[12]

Data

Sample Formation

We start with 2,285 U.S. IPOs from 1996 to 2000 meeting criteria that are common in the empirical IPO literature. We exclude closed-end funds, REITs, ADRs, banks and S&Ls, unit offers, partnerships, and IPOs with an offer price of less than $5.00 per share.

Most of our analysis focuses on a sample consisting of 196 IPOs in 1996 to 2000 for which Deutsche Morgan Grenfell (DMG), Salomon Smith Barney (SSB), or Credit Suisse First Boston (CSFB) was a bookrunner. In counting these IPOs, we include only IPOs for which the bookrunner was i) Deutsche Morgan Grenfell from July 1996 to June 1998, ii) CSFB from July 1998 to December 2000 *and* the CSFB technology group took credit in their end-of-year brochures,[13] or iii) Salomon Smith Barney or its predecessors from 1996 to 2000.[14] The periods

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[12] These numbers are from documents supplied by Citigroup to the U.S. House of Representatives Committee on Financial Services in 2002 and paragraph 141 of the April 21, 2003 Assurance of Discontinuance (AOD) portion of the Global Settlement. Information on the allocations of each of the 21 IPOs to Ebbers is available on request from the authors.

[13] Based upon SIC codes and Internet-related status, we independently tabulate 89 IPOs for which CSFB was a bookrunner during the relevant time period. Our tabulation includes two IPOs (University of Phoenix Online and Garmin, Ltd) that the CSFB tech group did not take credit for, and excludes two IPOs for which they did (TiVo and Symyx Technologies). Our qualitative results are unchanged whether we use the 89 IPOs from our tabulation or the 89 from the CSFB tabulation.

and industry restrictions for DMG and CSFB correspond to the periods during which Frank Quattrone was head of technology investment banking at these firms.

Of these 196 IPOs, there are 56 IPOs in which executives were being spun (five out of 11 DMG IPOs in 1996-1998, 35 out of 89 CSFB IPOs in 1998-2000, and 16 out of 100 SSB IPOs in 1996-2000). Four of these IPOs had both CSFB and SSB as joint bookrunners, which is why there are 200 bookrunners for 196 IPOs.

Our spinning data come from three sources. The five DMG IPOs and 31 of the CSFB IPOs are identified from Government Exhibit 2051 in the first trial of Frank Quattrone on obstruction of justice and witness tampering charges.[15] This exhibit, an Excel file labeled Tech_allocation.xls, contains the names of 205 individuals with "Friend of Frank" accounts with CSFB as of the week prior to March 21, 2000, according to the e-mail from CSFB broker Mike Grunwald to Frank Quattrone on that date containing this file as an attachment. The spreadsheet contains the name, account number, and affiliation (title and company name) of each individual, along with a spinning priority designation.

[14] SSB was created in November 1997 through the merger of Salomon Brothers with the Smith Barney division of Travelers, which subsequently merged with Citibank in 1998 to create Citigroup. Salomon Brothers was systematically involved in spinning starting in 1997 or earlier, so we include Salomon Brothers IPOs from January 1996 through the merger to create SSB, and Smith Barney IPOs from October 1997 (after the merger was announced) through the merger to create SSB. SSB IPOs are included through the end of December, 2000. We use SSB to refer to all three of these underwriters during the periods that are defined in this footnote.

[15] Quattrone was alleged to have sent an e-mail to the employees reporting to him that encouraged them to destroy records after he had been informed by CSFB's chief counsel that a government investigation of CSFB's IPO allocation practices was underway. This instruction led to the obstruction of justice and witness tampering charges. Quattrone's first trial ended with a mistrial on October 24, 2003 due to a hung jury, and his second trial ended on May 3, 2004 with convictions on all three counts. On March 20, 2006, the Second Circuit Court of Appeals overturned the convictions on grounds of improper jury instructions, while noting that there were sufficient grounds for conviction on all three counts. On August 22, 2006, prosecutors offered Quattrone a "deferred prosecution agreement" under which the government would drop all charges if Quattrone did not violate any laws during the following year. The dismissal of charges against Quattrone was formally approved on August 30, 2007.

We match the company names to a listing of IPOs from the respective time periods for which DMG or CSFB was a bookrunner.[16] Not all of the people listed in the Excel file are associated with an IPO from the relevant period and underwriter. Because some of the individuals are associated with venture capital firms or firms that did not go public during the relevant time periods with DMG or CSFB as a bookrunner, the list of 205 names yields 83 names associated with 31 CSFB IPOs and five DMG IPOs. [17]

The 31 CSFB IPOs with executives being spun is augmented with a list of "63 Silicon Valley 'Friends of Frank'" associated with 24 separate Silicon Valley companies published in the March 7, 2003 *San Jose Mercury News*. This list overlaps the Excel file list, but provides four additional IPOs for which Friend of Frank accounts had been set up for executives, apparently after mid-March 2000. The *San Jose Mercury News* list provides the number of IPOs that each executive was allocated, and the aggregate first-day profits earned by each of these executives if all of the allocations had been sold at the first closing market price.

The five DMG and 35 CSFB IPOs do not represent all of the IPOs from those investment banks for which executives were being spun. We do not have the names of about 80 individuals with Friend of Frank accounts who opened the account after mid-March, 2000 and did not live in Silicon Valley. Furthermore, other executives were being spun in a less systematic manner

[16] For two individuals (Mark Breier and Joe Caffarelli), the company that they were affiliated with is apparently incorrect in the CSFB spreadsheet as a result of sloppiness. In several other cases, the individual had changed jobs, although we use the company affiliation at the time of the IPO. There are two executives who have multiple accounts, using trusts or additional family members, so the 208 accounts generate 205 distinct names.

[17] There is a potential survivorship bias issue with the DMG IPOs, since all of these were completed prior to July 1998, when Frank Quattrone and most of his team moved from DMG to CSFB. We do not know if some of the executives of DMG IPOs from before July 1998 had a Friend of Frank account that was subsequently terminated prior to March 2000. We also do not know the date on which a personal brokerage account was established for any of the 208 Friend of Frank accounts, although the list is apparently in chronological order of when the accounts were established.

through CSFB brokerage accounts for which the stockbroker did not have discretion over trading in the account.[18]

The 16 IPOs from Salomon Smith Barney (SSB) in which executives were spun are identified by comparing the IPOs underwritten by SSB in 1996-2000 with the individual recipients, by name, of shares in 48 SSB IPOs for which we have allocation data. Because SSB's spinning was done through just two stockbrokers, we inspected only the clients of these two stockbrokers. The information about share allocations to individuals for these 48 IPOs was obtained through a Freedom of Information Act request made to the New York State Office of the Attorney General.

We classify an SSB IPO as having had the executives spun if a top executive of the company received allocations starting within one year of its date of going public from at least one of these 48 IPOs. For example, the Chief Financial Officer (CFO) of Focal Communications, Joseph Beatty, received IPO allocations in 16 different IPOs from SSB beginning shortly after Focal's IPO. Consequently, we classify Focal Communications as having been spun. In contrast, we classify McLeod as not spun for both our IPO and SEO analysis even though its CEO was spun, since the spinning of its CEO did not start until 15 months after its IPO (and 10 months after its first SEO). We identified the top executives of the 100 IPOs for which SSB was a bookrunner during 1996-2000 (the names of the executives are listed in the prospectuses), and identified the matches between IPO share recipients and these executives. If an executive bought shares in his or her own IPO, we do not include this allocation. Sixteen companies, primarily in the telecommunications industry, had a total of 58 executives who received nontrivial allocations of shares in multiple IPOs. Because we have data for only 48 IPOs for which SSB allocated

[18] We contacted several executives of CSFB IPOs who did not have a "Friend of Frank" account and asked them why. A variety of explanations were offered by those who were willing to talk. One individual said he did not get along with Frank Quattrone. Another said that he was spun, but in an ad hoc manner.

shares, our estimates of the first-day profits received by the executives are a lower bound estimate of their aggregate first-day gains.

Table 1-1 provides a list of the data sources and a detailed description of the variables used in our analysis.

Description of the Sample

Table 1-2 presents descriptive statistics categorized by spinning versus non-spinning companies for the 196 IPOs underwritten by DMG, CSFB, and SSB that meet our sample criteria. We report the means and medians for firm-specific and IPO-related variables separately for 1996-1998 (the pre-bubble period) and 1999-2000 (the bubble period) because underpricing was much more severe during the bubble period. 68 (35%) IPOs are from the pre-bubble period and 128 (65%) are from the bubble period. There are 56 companies whose executives were spun, representing 29% of the sample IPOs. Of these, 15 companies went public in the pre-bubble period, while 41 companies went public in the bubble period, suggesting that spinning was more prevalent in the bubble period.

The patterns across the subperiods are somewhat mixed due to the influence of two outliers. AT&T Wireless, an SSB IPO, and VA Linux, a CSFB IPO, both of which are classified as non-spinning companies, have a disproportionate effect on the means in 1999-2000. The April 2000 IPO of AT&T Wireless, with SSB, Merrill Lynch, and Goldman Sachs as joint bookrunners, was the largest IPO in U.S. history at the time, raising $11.3 billion. The December 1999 IPO of VA Linux was priced at $30 per share and closed at $239.25, up 697.5%, leaving over $920 million on the table (not including the overallotment option, whose inclusion boosts the total amount of money left on the table to over $1 billion).[19] To reduce the effects of outliers,

[19] We contacted the CEO of VA Linux at the time of the IPO, and he refused to discuss whether he had received IPO allocations from CSFB.

we winsorize the first-day returns at the 1st and 99th percentiles, using the return distribution for all 2,285 IPOs in the 1996-2000 period.

In Table 1-2, univariate sorts of spinning versus nonspinning IPOs show that spinning firms are younger, smaller, and more likely to be backed by a venture capitalist. The sorts also show that spinning firms are more likely to have an offer price that is revised upward from the midpoint of the file price range and to have a higher level of underpricing.

Further Details on Spinning

Of the 56 IPOs for which executives were being spun, we have data on the first-day profits of the executives for 36 of them. Table 1-3 provides summary statistics for these 36 IPOs. Panel A reports statistics for 20 companies for which CSFB was spinning the executives, and Panel B reports statistics for 16 companies for which SSB was spinning the executives. The averages in Table 1-3 are calculated using the company as a unit.

Of the executives that are being spun at a given company, as a group they averaged first-day profits of $1,253,000 ($1,691,000 at CSFB and $705,000 at SSB), shared by an average of about three executives. Our SSB numbers are lower bounds, however, because we have data on allocations from only 48 IPOs, and the true numbers may be similar to those from CSFB.

In the most extreme cases, 16 executives from a single firm (Qwest Communications) received a total of at least 164 IPO allocations from SSB, generating an aggregate of $8.03 million in first-day profits, and 12 executives from another firm (Phone.com) received a total of 651 IPO allocations from CSFB, generating an aggregate of $9.30 million in first-day profits.

Panel B of Table 1-3 shows that for SSB, the average period over which an individual executive was spun equals 2.2 years, despite the cessation of spinning in 2001. The extended spinning periods suggest that underwriters viewed spinning as an important activity aimed at facilitating a long-term relationship with corporate clients.

Further Details on the Executives being Spun

If the spinning of executives is designed to influence corporate decisions, then more influential executives should receive greater spinning profits. Table 1-4 presents summary statistics sorted by the position held by executives being spun. We restrict the sample in Table 1-4 to the 36 companies for which we have the number of IPOs allocated to each executive. Since some executives assume multiple titles, we categorize the executives on the basis of their highest position. We order the titles from highest to lowest as Chief Executive Officer (CEO), Chairman of the Board, President, Chief Financial Officer (CFO), Other Executives, and Director.

Panel A of Table 1-4 shows that of the 54 executives from 20 companies who were being spun by CSFB during 2000, 16 are CEOs. Panel B shows that of the 58 executives from 16 companies who were being spun by SSB during 1996 to 2000, 14 are CEOs. In both Panels A and B, the CEOs on average received more first-day profits from their IPO allocations than did less influential executives. Taking a weighted average of the two panels, in Panel C we report that the mean first-day profit is $519,598 for the 30 CEOs, and $360,005 for the 82 other officers and directors.

The results in Table 1-4 suggest that executives receive IPO allocations based on their position in the firm. Consistent with this, for the DMG and CSFB IPOs that are involved in spinning, the executives for which we have spinning priority codes have a mean of 2.04 for the 24 CEOs with this information, and a mean of 2.87 for the 31 vice presidents, CFOs, and chief technology officers. A priority code of 1 is the highest priority and a code of 4 is the lowest. This pattern of more influential executives being favored is consistent with the motivations for spinning shown in the quotations in Section 2: underwriters want to influence those with the most say in the firm regarding investment banking decisions, in order to extract the most return out of this investment.

An alternative explanation for the greater profits of CEOs is that they were wealthier individuals, and thus received bigger IPO allocations for this reason. Inconsistent with this explanation, however, is that CSFB's Friend of Frank accounts required the same deposit for all account holders, irrespective of their wealth, and that all executives with the same priority code received the same number of shares in a given IPO. Furthermore, none of the documents that we have seen relate the share allocations to the account size, although the title and company affiliation are always listed.

The Effect of Spinning on IPO Underpricing

OLS Regressions for the Spinning Sample

To estimate the quantitative effect of spinning on IPO underpricing, Table 1-5 presents ordinary least squares (OLS) regressions in which the level of underpricing (the percentage first-day return from the offer price to the closing price, winsorized at the 1% and 99%iles) is the dependent variable. We use the firm characteristic variables ln(assets), ln(1+age), a tech dummy, an Internet dummy, and a venture capital dummy as control variables. In addition, we include share overhang, defined as the ratio of retained shares to the public float (shares issued), as an additional control variable (see Bradley and Jordan, 2002). This variable captures both incentive effects and valuation effects.[20] Three additional dummy variables are a bubble dummy (equal to one if an IPO takes place in 1999-2000, and zero otherwise), a spin dummy (equal to one if the executives of the company going public were being spun by the bookrunner, and zero otherwise), and an all-star analyst coverage dummy (equal to one if the company is covered by an Institutional Investor all-star analyst employed by a bookrunner within 12 months of the IPO,

[20] The incentive effect interpretation is that the smaller the fraction of the firm sold (and therefore the higher the overhang), the less is the incentive of the issuer to limit underpricing. The valuation effect interpretation is that if the firm is going to raise a fixed amount of money, the higher the valuation on the firm, the lower is the fraction that must be sold (and therefore the higher the overhang). A high valuation is likely to be correlated with greater uncertainty about the company's valuation, possibly resulting in greater expected underpricing.

and zero otherwise).[21] We do not include in the regressions the percentage revision from the midpoint of the file range to the offer price. This partial adjustment variable has high predictive power, but it is very likely to be endogenous.[22] The regression equation is as follows:

$$\text{First-Day Return}_i = a_0 + a_1\ln(\text{Assets})_i + a_2\ln(1+\text{Age})_i + a_3\text{Tech Dummy}_i + a_4\text{Internet Dummy}_i + a_5\text{Overhang}_i + a_6\text{VC Dummy}_i + a_7\text{All-star Dummy}_i + a_8\text{Spin Dummy}_i + a_9\text{Bubble Dummy}_i + e_i,$$

where e_i is the residual for IPO i. This specification is similar to that used by Cliff and Denis (2004) and Loughran and Ritter (2004), among others.

In rows 1, 2, and 3 of Table 1-5, regression results using the sample of 196 IPOs from 1996-2000 underwritten by DMG, CSFB, and SSB and meeting our sample selection criteria are reported. The only difference among the three rows is that row 2 includes an all-star analyst coverage dummy and row 3 includes an additional spin dummy. The coefficient on the all-star coverage dummy does not seem to be affected by adding the spin dummy in row 3. The coefficient of 22.68 (t=1.96) on the spin dummy indicates that, everything else the same, the first-day return was 22.68% higher when the executives of the issuing firm were spun. The row 3 coefficient on the all-star dummy of 9.89 (t=1.03) indicates that all-star analyst coverage is associated with 9.89% greater underpricing, although the effect is smaller and less significant

[21] We use a dummy variable to proxy for spinning status instead of a continuous variable because a continuous variable based on the ex-post first day profit suffers from look-ahead bias. Since the spinning decision is made on a yes or no basis and the exact profit from spinning is not known at the time of decision, a dummy variable is more appropriate.

[22] Especially during 1999-2000, some IPOs used what was called a “walkup strategy” in which the file price was set low, with the expectation of an upward revision in order to create the impression of a “hot issue.” For the issuers, there is a risk involved with agreeing to a walkup strategy, since the underwriters may use their bargaining power to ex-post take advantage of the issuer and set too low an offer price. This holdup risk may be of less concern for spinning firms due to less of a focus on maximizing IPO proceeds, which implies a positive relation between the use of a walkup strategy and spinning. This hypothesized relation poses a problem with estimating the effect of spinning on underpricing if the price revision is included, since this relation suggests that the price revision will take some explanatory power from spinning in explaining underpricing. This problem should be less severe in the pre-bubble period. Our unreported empirical results are consistent with these predictions.

than the magnitudes reported in Cliff and Denis (2004) and in Table 1-6 in the next sub-section of this paper.

In row 4 of Table 1-5, only IPOs from 1996 to 1998 are used. For this subperiod, the coefficient on the spin dummy variable is 17.42 (t=2.76), suggesting that IPOs in which the executives were being spun had first-day returns that were 17.42% higher. Thus, during 1996-1998, the 23.5% of the IPOs with executives being spun were underpriced substantially more than other IPOs from these underwriters.

In row 5 of Table 1-5, the bubble period coefficient on the spin dummy variable is 26.36, indicating that IPOs for which there was spinning had first-day returns that were 26.36% higher. The coefficient has a t-stat of 1.71, which is statistically significant only at the 10% level. This lower significance level in the bubble subperiod is due to the high standard errors, which are approximately 2.5 times as large as for the pre-bubble period, despite a sample size that is almost 90% higher (128 vs. 68 IPOs). This reflects the much higher variance of first-day returns during 1999-2000.

OLS Regressions for the Entire Sample

In Table 1-5, we reported regression results using a sample of 196 IPOs from 1996 to 2000 for which DMG, CSFB, or SSB was a bookrunner. In Table 1-6, we use the full sample of 2,285 IPOs from 1996 to 2000 for which complete data are available. Furthermore, we add one additional explanatory variable, a top-tier underwriter dummy variable. We did not include this in the Table 1-5 regressions because DMG, CSFB, and SSB are all top-tier underwriters. The top-tier dummy variable is assigned a value of one (zero otherwise) if at least one of the lead underwriters has a Carter-Manaster (1990) ranking of 8 or above on a 1-9 scale. As many authors have noted, the choice of a top-tier lead underwriter is endogenous. Loughran and Ritter (2004), however, show that using an instrument for top-tier status does not materially affect the parameter estimate, and in unreported results we confirm this for our sample.

We classify the sample of 2,285 IPOs into three categories with respect to spinning, with 56 IPOs from DMG, CSFB, and SSB classified as having been spun, 140 IPOs from DMG, CSFB, and SSB classified as non-spun, and the remaining 2,089 IPOs from other underwriters classified as of uncertain status because we do not have information on them. In order to compare spinning IPOs versus non-spinning IPOs, holding other things constant, we use dummies to indicate whether the firm is spun or the IPO's spinning status is unknown, with non-spinning IPOs as the base case.[23]

The Table 1-6 regressions show that, both for 1996-2000 as a whole and for each of the two subperiods, IPOs in which the executives received IPO allocations were underpriced by an economically significant amount more than if no spinning occurred, with a point estimate of 27.81% (t=2.64) for the whole sample period. In row 3, the point estimate of underpricing for IPOs of unknown spinning status is 6.34%, although this is not statistically significant at conventional levels (t=1.25). The ratio of these coefficients, 6.34/27.81 = 0.23, suggests that 23% of IPOs may have been spun.

To summarize, the regression results in Tables 1-5 and 1-6 are consistent with the spinning hypothesis prediction that, holding everything else constant, IPOs whose executives are being spun are more underpriced.[24] Furthermore, the magnitude is economically significant. The

[23] When using non-spinning IPOs as the base case, we are implicitly assuming that the underpricing of these IPOs is "normal," in other words, these IPOs are not more underpriced because they have chosen a spinning underwriter. Empirically, we do not find evidence supporting the claim that these non-spinning IPOs are more underpriced than they otherwise would be.

[24] Spinning has largely ceased since 2000. In unreported out-of-sample tests, we compare the average underpricing of the underwriters involved in spinning (DMG, CSFB, and SSB) with the average underpricing of other underwriters. The prediction is that IPOs underwritten by the spinning underwriters should have significantly higher underpricing than IPOs underwritten by other underwriters in the 1996-2000 period and the average underpricing

Table 1-6 regression results also support the analyst lust hypothesis, confirming the findings of Cliff and Denis (2004). For 1996-2000, the row 3 coefficient on the all-star analyst dummy variable implies 15.20% (t=4.48) more underpricing when a bookrunner has an all-star analyst who subsequently covers the company within a year of the IPO.

The subperiod results in rows 4 and 5 of Table 1-6 show that spinning firms are 16.07% more underpriced (t=2.39) during 1996-1998 and 27.52% (t=1.91) more underpriced during 1999-2000 than non-spinning firms. These subperiod coefficients are similar to those in Table 1-5 and the magnitudes suggest that underpricing due to spinning is higher in the bubble period than in the pre-bubble period, although the coefficients are not reliably different from each other. Taking the ratio of the bubble period coefficients on the unknown spinning dummy and the spinning dummy of 8.16/27.52 = 0.30 suggests that 30% of IPOs may have been spun during the bubble period.

Using these results, we can estimate the amount of underpricing that can be attributed to the analyst lust and spinning hypotheses during the bubble period, when underpricing averaged 65%. In our sample of 2,285 IPOs, 20% of the IPOs in the bubble period received coverage from an all-star analyst. The coefficient on the all-star dummy from row 5 of Table 1-6 is 18.45, suggesting that analyst lust can account for 3.7% of the average underpricing in that period. If we assume that 30% of all IPOs in the bubble period are being spun, then the coefficient of 27.52 in row 5 of Table 1-6 translates into 8.3% additional underpricing due to spinning. Combining both analyst lust and spinning yields 12% in underpricing in the bubble period. Thus, of the 65% average underpricing in the bubble period, we estimate that spinning together with analyst lust can explain about 12% of the 65% average underpricing.

should not be significantly different across the underwriter groups in the 2001-2008 period. Our results are consistent with this prediction.

Endogeneity Issues

In this subsection, we present two alternative explanations of the relation between underpricing and spinning, based on the assumption that the causality goes from underpricing to spinning, rather than from spinning to underpricing as we have assumed. The first alternative is that underwriters might have a higher propensity to spin the executives of IPOs with high first-day runups as a way of compensating the executives for leaving a large amount of money on the table. If this is the case, then causality is going from high returns to spinning.

There are several reasons to doubt this explanation. First, we have not seen or heard of any evidence that hot IPO allocations were withheld from the executives of firms with low first-day returns. In fact, several of the firms in our dataset that were spun had a negative first-day return. Second, the promise of IPO allocations was generally made at the time of underwriter selection before a firm went public, and the promises were not conditioned on first-day performance, as far as we know. Although the Friend of Frank account list does not indicate at what stage in the going public process each account is opened, we can see from the regulatory settlement quoted in Section 2 and from indirect evidence that the accounts are typically opened before the IPO. Furthermore, the March 2000 Excel file shows several executives that had just opened a Friend of Frank account although their companies never went public due to the tech bubble collapse after March 2000.[25]

As a second alternative explanation that relates spinning to underpricing, suppose that some IPOs are expected to be severely underpriced for some unobserved exogenous reason. These IPOs are the most attractive underwriting clients, so underwriters would want to spin these

[25] Specifically, four executives from DoveBid, Inc., three from SupplierMarket.com, and two from AllAdvantage.com are listed on the March 2000 Excel spreadsheet. All three of these companies filed in February or March 2000 to go public, but later withdrew their offerings.

executives to win the mandate even if spinning has no effect on the subsequent offer price. This suggests that the unobserved exogenous factor is affecting both the decision to spin and the level of underpricing. If this unobserved factor is not accounted for in the underpricing regression, then the spin variable will be endogenous.

To address the possibility that spinning may be endogenous, we conduct a two-stage estimation procedure similar to those used in Lowry and Shu (2002) and Cliff and Denis (2004). In the first stage, we estimate a probit regression for spinning and an OLS regression for underpricing where the complete set of exogenous variables are included. The fitted values from the first stage regressions are then used as instruments in the second stage regressions, where the standard errors are corrected based on Maddala (1983). The complete set of variables includes control variables that are used in both regressions, variables that are used to identify spinning, and variables that are used to identify underpricing. The common control variables consist of ln(assets), ln(1+age), the technology dummy, the Internet dummy, and the venture capital backing dummy.

In choosing variables that can be used to identify spinning, but not underpricing, we consider the underwriter's motivation for offering spinning and the issuer's likelihood of accepting spinning. Conceptually, underwriters are more likely to offer spinning to firms that are in greater need of investment banking services in the future, such as for a follow-on offering. To proxy for the likelihood of using external financing, we use the ratio of capital expenditure/assets from the fiscal year prior to the IPO and the growth rate of sales over the two most recent fiscal years.[26] To proxy for how attractive a stream of imperfectly correlated side payments would be

[26] For firms without sales data in either year t-1 or t-2, their sales growth numbers are set to the median sales growth of 0.869 per year. Sales growth is measured as the proportional change in sales from year t-2 to year t-1, with fiscal year t=0 being the year of the IPO.

to executives with undiversified and illiquid positions in their company, we use the fraction of pre-issue equity owned by insiders, defined as all officers and directors as a group.

In addition, personal relations may play a role since some executives were not offered spinning because they did not get along with Frank Quattrone, as implied by the name of the account: "Friend of Frank." To proxy for personal ties, we use a dummy variable *instate* to account for the physical proximity of the issuing firm's headquarter to the location of the underwriter's spinning desk since physical closeness may increase the amount of contacts and foster personal relations.[27] As for issuers, those with low ethical standards should be more willing to accept side payments. To control for this factor, we create a low ethics proxy based on top executive stock option backdating statistics, where firms that have engaged in backdating or have a high probability of backdating are deemed to have low ethics.[28] Since these five variables have no obvious theoretical links to underpricing, we use them as identifying variables for spinning.

The identifying variables that are included in the second stage underpricing regression, but not in the spinning regression, are share overhang, the all-star analyst dummy, and the bubble dummy. In Table 1-7, the first stage estimation results are reported in the first two columns and

[27] For IPOs underwritten by DMG or CSFB, *instate* is one if the IPO firm is located in California where Frank Quattrone's technology group resided and zero otherwise. Similarly, for IPOs underwritten by SSB, *instate* is one if the IPO firm is in New York where the unit in charge of spinning was located and zero otherwise.

[28] From the Glass-Lewis & Co.'s Yellow Card Trend Alert as of March 2007 and SEC filings, we classify eight of our 196 firms as having backdated options based on evidence that they have either charged or restated previously unrecognized expenses related to misdated stock options. For the other 188 firms, we calculate their probability of backdating based on the number of unique at the money option grants and the number of these grants with an exercise price at the lowest price of the month using data from Thompson Reuter's Insider Filings database before August 29, 2002, when SOX revised the option grant reporting rules. For each firm, the probability of backdating is calculated as the Bayesian probability of backdating conditional on observing a number of option grants at the lowest price of the month out of a total number of option grants for the firm. The probability measure is closely based on Heron and Lie (2006), Bebchuk, Grinstein, and Peyer (2010), and Carow, Heron, Lie, and Neal (2009). The low ethics dummy equals one (zero otherwise) if the firm is one of the eight firms engaged in option backdating or if the firm has a probability of backdating greater than 95%.

the second stage results are reported in the next two columns. From the first stage estimation, the test of significance of the five identifying variables for spinning suggests that these variables are significantly related to spinning (*p*-value=.022), while not related to underpricing (*p*-value=.387). Conversely, the test of significance of the three identifying variables for underpricing suggests that these variables are significantly related to underpricing (*p*-value=.0001), while not related to spinning (*p*-value=.848).

The primary variable of interest is the instrumented spinning variable. In the last column of Table 1-7, when endogeneity is controlled for, the coefficient on the spinning instrument is 22.69, with a *t*-statistic of 2.01. Since this coefficient is similar to those reported in Tables 1-5 and 1-6, it suggests that the relation between spinning and underpricing is significant even controlling for the possibility of endogeneity. Furthermore, in the third column, the underpricing instrument's coefficient of 0.001 (*z*=0.22) suggests that underpricing does not cause spinning. These results are consistent with the spinning hypothesis, which posits that executives who receive side payments from underwriters put less emphasis on maximizing the proceeds from their IPO, resulting in greater underpricing.

The Effect of Spinning on Subsequent Investment Banking Mandates

In this section, we test the hypothesis that spinning affects an issuer's probability of using the same underwriter for its subsequent investment banking business. In Table 1-8, we present the loyalty statistics for the usage of investment banking service in the post-IPO period for 196 IPOs by DMG, CSFB, or SSB. We limit the post-IPO transactions under examination to those completed before the end of 2001 since it is difficult to assess the effect of spinning in later deals, with our spinning data ending in 2000. In addition, we focus on issuing companies' first post-IPO transactions, since the effect of spinning on decisions is expected to deteriorate over time.

Panel A of Table 1-8 analyzes the 54 of the 196 IPO firms that conducted their first seasoned equity offering (SEO) by the end of 2001. Panel B analyzes 101 of the 196 IPO firms that conducted their first investment banking transaction other than an SEO before the end of 2001. We analyze SEO and non-SEO transactions separately because the effect of spinning may vary for different types of deals. The underwriter's services required for SEOs are similar to those required for IPOs, but may be different from those required for private equity placements, debt offerings (private or public), and merger and acquisition (M&A) deals.

In Panel A of Table 1-8, for issuers whose executives are not being spun, 11 of the 36 issuers used a different lead underwriter for their SEO, a switch rate of 31%. This switch rate is similar to the 30% that Krigman, Shaw, and Womack (2001) report and the 33.5% that Cliff and Denis (2004) report. For issuers that are subject to spinning, 17 out of 18 companies used the same lead underwriter for both their IPO and first SEO, a switch rate of only 6%. The 25% difference in switch rates, assuming independence, is statistically different from zero, with a *p*-value of .037.

For the first non-SEO transactions in Panel B, 47% of spinners are loyal to their IPO underwriters, which is a larger percentage than the 37% of non-spinners being loyal to their IPO underwriters. This 10% difference in the loyalty rates is smaller than the 25% difference for the first SEOs and is statistically insignificant. We conjecture that the effect of spinning is weaker in this case partly because non-SEO deals tend to use evaluative criteria for choosing investment bankers that are different from the criteria used for IPOs and SEOs. For instance, companies may prefer an investment banking firm with more M&A experience in their industry.

In unreported results, we have conducted a series of probit regressions to predict loyalty for the first SEO, controlling for up to seven variables that might be related to switching propensities. The effect of spinning on loyalty is economically and statistically significant in all specifications and the increase in the probability of being loyal due to spinning based on predicted values is around 25%, consistent with the univariate results reported in Panel A of Table 1-8. More precisely, firms that are involved in spinning are more likely to keep the same underwriter than firms that are not, especially for their first SEO transactions. This suggests that the spinning of the executives does affect their behavior.[29]

Estimation of the Costs and Benefits of Spinning

Costs and Benefits for the Executives and Shareholders

The total amount of money left on the table for the 56 spinning IPOs is \$4.24 billion, an average of \$76 million per firm. We calculate the incremental money left on the table due to spinning as $(OP_{ns} - OP_s) \cdot N_{issued}$, where OP_{ns} is the offer price in the absence of spinning, OP_s is the offer price with spinning, and N_{issued} is the number of shares issued in the IPO. We can estimate the offer price without spinning as $OP_{ns} = P_1/(P_1/OP_s - 0.2268)$, where P_1 is the first day closing price, OP_s is the offer price observed, and 0.2268 is the coefficient on spinning from the regression in row 3 of Table 1-5, expressed as a decimal rather than a percentage. The money left on the table due to spinning is then estimated to be \$952 million in total, an average of \$17 million per spinning firm.

For the 36 of the 56 IPOs whose executives were spun for which we have allocation information, the average per firm spinning profit accruing to the executives reported in Table 1-4 is approximately \$1.3 million, which is less than 8% of the \$17 million incremental money left on the table due to spinning. Thus, the executives gained \$1.3 million on average at the expense

[29] Another way in which spinning can have an effect on corporate decisions is through the gross spread paid to the underwriter in their post-IPO public offerings. In unreported results, controlling for issue size and loyalty, we find that there is a statistically insignificant 15 basis point increase in the gross spread paid to underwriters for subsequent SEOs if the issuing firm's executives are being spun.

of the shareholders, who lost $17 million per issue from spinning. These numbers illustrate the magnitude of agency problems that can arise from putting the decision rights at a corporation into the hands of a few executives. The underwriters successfully co-opted these people, but gave them only a small slice of the pie. While the benefit that the executives received is non-trivial, the loss to the shareholders is far greater.

Since the executives being spun are usually also shareholders of the company, we collect ownership holding data from the IPO prospectuses for the 146 officers and directors. On average, the executives being spun hold 23% of the total shares in their company before the IPO, which means they have lost $3.9 million in foregone proceeds due to spinning (23% of the incremental $17 million left on the table), and gained only $1.3 million in return. At first glance it appears that the harm executives inflicted on themselves through excessive dilution exceeds their private benefits. Several things, however, need to be kept in mind. First, it is important to note that this cost is an opportunity cost, not an out-of-pocket direct cost, and people generally do not view opportunity costs the same as direct costs. Second, the executives may not know beforehand or even afterward how much opportunity cost is involved in spinning, which results in a possible underestimation of the cost ex-ante. Third, it should be noted that most of these executives had very undiversified and illiquid portfolios consisting primarily of company stock and options, with much of the stock subject to lockup provisions and stock options subject to vesting restrictions. Many of them had significant paper wealth, but cash income that was imperfectly correlated with their company's stock price apparently had considerable appeal.

Costs and Benefits for the Underwriters

We calculate the profit from spinning for the three underwriters, DMG, CSFB, and SSB, as $\gamma(OP_{ns} - OP_s) \cdot N_{issued} + g \cdot (OP_s - OP_{ns}) \cdot N_{issued} + \sum_{n=1}^{N} \pi_n(\bar{S}) \cdot PM_n \cdot g_n \cdot Proceed_n - \gamma\bar{S}$ from each IPO issuer engaged in spinning. The first term of the profit function, $\gamma(OP_{ns} - OP_s) \cdot$

N_{issued}, is the underwriter's fractional share of money left on the table that flows to the underwriter through soft dollar payments, γ, times the money left on the table due to spinning. The second term, $g \cdot (OP_s - OP_{ns}) \cdot N_{issued}$, is the loss of gross spread revenue from a lower offer price when spinning is offered, where g is the fractional gross spread on the IPO. The third term, $\sum_{n=1}^{N} \pi_n(\bar{S}) \cdot PM_n \cdot g_n \cdot Proceed_n$, measures the incremental profit gained from future deals due to spinning, where $\pi_n(\bar{S})$ is the change in the probability of choosing the same underwriter due to spinning, $g_n \cdot Proceed_n$ is the gross spread revenue, and PM_n is the fraction of the nth deal's revenue that is profit. The last term, $\gamma\bar{S}$, is the opportunity cost of spinning, measured as the underwriter's fractional share of the money left on the table, γ, times the aggregate first-day profit for all the executives being spun, $\bar{S}$. This last term represents the soft dollar revenue that would have been earned if these shares had been allocated to rent-seeking institutional investors rather than the executives.

Most of the variables can be estimated from the empirical analysis, with the exception of the fraction of the underwriter's share of the money left on the table, γ, and the average profit margin for the first SEOs, PM_n. To illustrate how costs and benefits of spinning are calculated, we first consider the scenario when γ = 35% and the profit margin, PM_n = 30%.[30]

In this case, the profit from soft dollar commissions, $\gamma(OP_{ns} - OP_s) \cdot N_{issued}$, is estimated as 35% of the \$952 million of incremental money left on the table, or \$333 million. The loss from a lower gross spread, $g \cdot (OP_s - OP_{ns}) \cdot N_{issued}$, is \$62 million using a proceeds-weighted average fractional gross spread of 0.065. Using only the first post-IPO public equity offerings, of the 56 firms whose executives have been spun, there are 18 SEOs of which 17 issuers have

[30] Our base case assumption that 35% of the money left on the table flows back to the underwriters is based upon conversations with senior investment banking executives. Corroborating evidence can be found from regression analysis using quarterly commission revenue and money left on the table figures for IPOs underwritten by Robertson Stephens.

chosen their IPO underwriter, with total fees to the three underwriters of $207 million. The typical loyalty rate is estimated to be 69% and, due to spinning, the loyalty rate increases to 94% based on Table 1-8. We estimate the underwriters' aggregate profit from spinning to be $16.5 million (0.30 × $207m/0.94 × 0.25=$16.5m), which equals the assumed profit margin of 30% times the fees gained by these underwriters due to spinning ($207 million/0.94=$220 million in SEO fees accruing to all underwriters, times the 25% higher market share due to the spinning-induced loyalty). For the post-IPO investment banking deals, our estimates of the underwriters' spinning profits are a lower bound because we only count the first SEOs.

The opportunity cost of spinning, $\gamma\bar{S}$, is estimated to be $25.5 million, calculated as the underwriter's 35% fractional share of the money left on the table received from soft dollars times the aggregate first day profit for all the executives being spun of $72.8 million for 56 firms, using $1.3 million as the firm level first-day profit average. Thus, the total pre-tax profit from spinning for the three underwriters in this case is $262 million, which is $333m-$62m+$16.5m-$25.5m=$262 million. It should be noted, however, that this number does not include the cost of subsequent regulatory settlements.

In unreported sensitivity analysis, we investigate how underwriters' total profit from spinning changes by varying the soft dollar commission ratio, γ, and the SEO profit margin. We find that except for very low values of γ, where the cost of spinning outweighs the benefits of spinning, the underwriter's profits from spinning are positive and substantial. Given the conservative nature of our assumptions, these calculations suggest that spinning can indeed be profitable for underwriters in the absence of significant regulatory penalties.

Summary

Spinning, the practice of allocating hot IPOs to corporate executives with the purpose of affecting corporate investment banking decisions, previously has not been empirically studied in the finance literature. In this paper, we use a unique dataset to examine the economic consequences of IPO spinning by measuring the effect of IPO spinning on the underpricing of IPOs and the choice of underwriter for subsequent public offerings.

The spinning hypothesis states that executives are less likely to seek the highest offer price if they receive side payments from underwriters. We find that holding everything else constant, IPOs in which the executives are being spun are underpriced about 23% more than other IPOs. This result is consistent with the spinning hypothesis in Loughran and Ritter (2004). We estimate that the combined effects of issuers seeking all-star analyst coverage and spinning, rather than exclusively seeking IPO proceeds maximization, can account for approximately 12% of the 65% average underpricing during the 1999-2000 bubble period.

In addition, we find that spinning is negatively related to the probability of switching underwriters between the IPO and the first SEO. Our analysis suggests that firms that are involved in spinning are dramatically less likely to switch underwriters for their next public equity offering: 31% of issuers whose executives were not spun switched underwriters, whereas only 6% of issuers whose executives were spun switched underwriters.

In summary, we find that spinning affected not only IPO underpricing, but also the awarding of mandates on subsequent investment banking deals. This suggests that the spinning of corporate executives by investment bankers accomplished its purpose: it affected the corporate decisions of executives who received hot IPO allocations.

It is worth noting that the spinning of corporate executives has largely ceased since 2000 in the U.S. This cessation is due to both a regulatory crackdown and a dearth of hot IPOs to

allocate. Although spinning has largely disappeared in the U.S., other countries have not prohibited it. As long as rents are present in the form of hot IPOs, rent-seeking behavior will arise. Consequently, we predict that there will be future scandals associated with IPOs as long as there is discretion in the allocation of underpriced shares.

Spinning is not the only manifestation of agency problems in financial markets. Many commentators have blamed a culture of compensation involving large bonuses without clawback provisions as a contributor to the proliferation of mortgage-backed securities, some of which collapsed in value when housing prices fell in 2007-2009 in the U.S. Another example of the co-opting of decision makers in financial markets is junkets for mutual fund traders paid for by brokerage firms.[31] Both the side payments to the traders working at mutual funds and the spinning of corporate executives are examples of actions that arise when principals delegate decision-making to agents. The costs imposed on shareholders and the benefits accruing to managers can rarely be quantified. In the case of spinning, we are able to estimate these costs and benefits.

[31] According to U.S. SEC press release 2008-32 on March 5, 2008, mutual fund organization Fidelity agreed to pay an $8 million fine as a result of failing to seek best execution due to "13 current or former employees including high-ranking executives accepting more than $1.6 million in travel, entertainment, and other gifts paid for by outside brokers courting the massive trading business Fidelity generates on behalf of the mutual funds that it manages."

Table 1-1. Variable Definitions

Variable	Definition	Source	Means 2,285 IPOs	Means 196 IPOs
First-day return	Percentage change from the offer price to the first day closing price, winsorized at the 1% (a value of -18%) and 99% (a value of 293%) percentiles.	Thomson Financial's SDC, with corrections by the authors.	33.7%	54.9%
Proceeds	The offer price times the number of global shares offered, excluding overallotment options, expressed in terms of 2003 purchasing power.	Thomson Financial's SDC, with corrections.	$115.8m	$205.2m
Price revision	Percentage change from the middle of the original file price range to the offer price.	Thomson Financial's SDC, with corrections.	5.0%	14.0%
Top-tier dummy	Equals one (zero otherwise) if the lead underwriter has an updated Carter and Manaster (1990) rank of 8 or more.	Jay Ritter's web-site.	69.6%	100%
Assets	Firm's pre-issue book value of assets, expressed in millions of dollars of 2003 purchasing power.	Thomson Financial's SDC, with corrections by the authors.	$694.5m	$444.1m
Tech dummy	Equals one (zero otherwise) if the firm is in the technology business [Defined in Appendix D of Loughran and Ritter (2004)], not including biotech.	Thomson Financial's SDC, with corrections by the authors.	51.2%	74.0%
Internet dummy	Equals one (zero otherwise) if the firm is in the Internet business [Defined in Appendix D of Loughran and Ritter (2004)].	Jay Ritter's web-site.	20.4%	37.2%
Age	Calendar year of offering minus the calendar year of founding [Defined in Field and Karpoff (2002) and Appendix A of Loughran and Ritter (2004)], winsorized at 80 years.	Jay Ritter's web-site.	7 years (median)	5 years (median)
Share overhang	Ratio of retained shares to the public float (shares issued, exclusive of overallotment option shares).	Thomson Financial's SDC, with corrections by the authors.	3.46	4.59
VC dummy	Equals one (zero otherwise) if the IPO was backed by venture capital.	Thomson Financial's SDC, with corrections from Paul Gompers, Josh Lerner, and Jerry Cao, and the authors.	42.1%	56.1%
Bubble dummy	Equals one (zero otherwise) if the IPO occurred during 1999-2000.		37.6%	65.3%

There are two sets of data. The first set consists of 2,285 U.S. operating firm IPOs from 1996 to 2000 for which the offer price is at least $5.00 and complete data on all of the variables is available. Unit offers, ADRs, banks and S&Ls, and partnerships offers have been excluded. The second set consists of 196 IPOs (a subset of the 2,285 IPOs) that are underwritten by Deutsche Morgan Grenfell (DMG) from July 1, 1996 to June 30, 1998; the technology group of Credit Suisse First Boston (CSFB) from July 1, 1998 to December 31, 2000; or Salomon Brothers from January 1, 1996 to November 1997, Smith Barney from July 1, 1997 to November 1997, and Salomon Smith Barney from November 1997 to December 31, 2000 (collectively, SSB). All dollar values are expressed in terms of 2003 purchasing power using the Consumer Price Index.

Table 1-1. Continued

Variable	Definition	Source	Means 2,285 IPOs	Means 196 IPOs
All-star dummy	Equals one (zero otherwise) if the IPO is covered by an *Institutional Investor* all-star analyst (top 3) from a lead underwriter within one year of the IPO. IPOs in year t are deemed to be covered by an all-star from October of year t-1 if this analyst initiates coverage within 12 months of the IPO.	I/B/E/S, Investext, and other sources; Dan Bradley and Jonathan Clarke and others; *Institutional Investor*'s annual October issue for 1995-1999.	19.1%	34.7%
Spin dummy	Equals one (zero otherwise) if the IPO is one of the 56 IPOs during 1996-2000 for which one or more executives of the IPO firm received IPO allocations from one of the three underwriters (SSB, CSFB, and DMG). For SSB, the allocations must have started within 12 months of the IPO.	CSFB: Tech_allocation.xls, *San Jose Mercury News* "63 Silicon Valley 'Friends of Frank'" on March 7, 2003 DMG: Tech_allocation.xls SSB: Internal SSB documents, obtained through a Freedom of Information Act request made to the New York State Office of the Attorney General.	2.45%	28.6%
Instate dummy	For IPOs underwritten by DMG or CSFB, instate is one if the IPO firm is located in California and for IPOs underwritten by SSB, instate is one if the IPO firm is in New York and zero otherwise.	Compustat for location information.	-	36.2%
Low ethics dummy	Low ethics dummy equals one (zero otherwise) if there is evidence that the firm engaged in option backdating or if the firm has a probability of backdating greater than 95%. The probability of backdating is calculated based on the number of unique at the money option grants and the number of these grants with an exercise price at the lowest price of the month using data from Insider Filings database before August 29, 2002. For each firm, the probability of backdating is calculated as the Bayesian probability of backdating conditional on observing a number of option grants at the lowest price of the month out of the total number of option grants for the firm.	Glass-Lewis & Co.'s Yellow Card Trend Alert as of March 2007; Edgar SEC filings; Option grant data from Thomson Reuters' Insider Filings database.	-	7.1%
Pre-IPO insider holdings	The pre-IPO holdings of "all executive officers and directors as a group" relative to all pre-issue shares outstanding reported in the prospectus, expressed as a decimal.	Hand collected from prospectus.	-	53.7%

Table 1-1. Continued

Variable	Definition	Source	Means 2,285 IPOs	Means 196 IPOs
Capex/Assets	Ratio of the capital expenditure to total assets from the most recent fiscal year before the IPO.	Compustat, hand-collected from prospectus.	-	0.10
Sales growth	Change in sales over the two most recent fiscal years before the IPO, expressed as a fraction of year t-2 sales, missing data is set to the median of sales growth.	Compustat, hand-collected from prospectus.	-	0.869 (median)
SEO dummy	Equals one (zero otherwise) if the firm had a Seasoned Equity Offering from the time of their IPO to the end of 2001. The 54 of the 196 IPOs with a value equal to one.	Thomson Financial's SDC database.	-	27.6%
Loyalty dummy	Equals one (zero otherwise) if the firm used the same lead underwriter for their IPO and SEO.	Thomson Financial's SDC database.	-	77.8%

Table 1-2. Mean and Median of Descriptive Variables Categorized by Spinning

	1996-1998		1999-2000		All (1996-2000)	
Segmented by	Mean	Median	Mean	Median	Mean	Median
First-day return						
Spinner	31.8%***	33.6%**	106.8%***	107.1%***	86.7%***	59.4%***
Non-Spinner	12.1%	9.7%	60.5%	27.4%	42.2%	15.3%
Proceeds (millions)						
Spinner	$99.1	$50.8	$117.5	$70.7	$112.6	$68.4
Non-Spinner	$103.0	$60.9	$327.1	$91.1	$242.3	$79.7
Assets (millions)						
Spinner	$99.6	$19.1***	$176.9	$32.1	$155.5	$29.0***
Non-Spinner	$242.2	$85.5	$752.5	$66.3	$559.3	$72.0
Age						
Spinner	7 years*	5 years	5 years**	4 years	5 years***	4 years**
Non-Spinner	15 years	8 years	11 years	4 years	12 years	6 years
Share overhang						
Spinner	3.2	2.3	5.9*	5.4**	5.1**	5.1***
Non-Spinner	3.3	2.8	5.1	4.7	4.4	4.1
Money left on table (millions)						
Spinner	$30.4*	$24.0	$101.8	$83.5**	$82.7	$50.9***
Non-Spinner	$14.7	$5.7	$115.4	$27.9	$77.3	$13.4
Price revision						
Spinner	9.9%*	12.5%**	30.5%**	23.1%*	25.0%***	16.0%***
Non-Spinner	0.7%	0%	15.1%	9.1%	9.6%	6.9%
Percentage with an offer price above the maximum of the file price range						
Spinner	46.7%**		63.4%**		58.9%***	
Non-Spinner	20.7%		42.5%		34.3%	
Percentage of tech firms						
Spinner	93.3%***		95.1%**		94.6%***	
Non-Spinner	43.4%		79.3%		65.7%	
Percentage of Venture Capital-backed firms						
Spinner	46.7%		85.4%***		75.0%***	
Non-Spinner	28.3%		60.9%		48.6%	

The sample consists of 196 operating company IPOs underwritten by Deutsche Morgan Grenfell (DMG) from July 1, 1996 to June 30, 1998; Credit Suisse First Boston (CSFB) from July 1, 1998 to December 31, 2000 for which the company's industry is technology or Internet-related; or Salomon Brothers from January 1, 1996 to November 1997, Smith Barney from July 1, 1997 to November 1997, and Salomon Smith Barney from November 1997 to December 31, 2000 (collectively, SSB). The 56 spinning IPOs are the IPOs in which one or more top executives received allocations of hot IPOs from the bookrunner. *First-day return* is defined as the percentage change from the offer price to the first day closing price, winsorized at the 1%ile and 99%ile. *Proceeds* are computed by multiplying the offer price with the global number of shares offered, expressed in millions of dollars. *Assets* are the firm's pre-issue book value of assets, expressed in millions of dollars. *Age* is computed as the IPO year minus the founding year. *Share overhang* is the ratio of retained shares to the public float. *Money left on the table* is defined as the first-day price change (offer price to close) times the number of shares issued (global offering amount, excluding overallotment options), expressed in millions of dollars. *Price revision* is defined as the percentage change from the middle of the original file price range to the offer price. *Tech* is the percentage of IPOs that are classified as technology (including telecom) or Internet-related. Means of spinners and non-spinners are tested for equality using the unpaired two sample *t* test assuming independence and normality. Medians of spinners and non-spinners are tested for equality using a nonparametric two-sample test that tests the null hypothesis that the medians of the population from which two samples are drawn are identical. The significance of the mean test's *t*-statistics and the median test's *chi*-squared statistics at 1%, 5%, and 10% levels are denoted by ***, **, *, respectively.

Table 1-3. IPO Allocation Statistics for 36 Companies with Executives Spun by SSB or CSFB

	Mean	Median	Std Dev	Minimum	Maximum
Panel A: 20 CSFB IPOs from 1998 to 2000					
Money Left on the Table (millions $)	101.7	77.2	114.9	-16.1	476.1
First-Day Profit/Money Left on Table	0.336	0.018	1.337	-0.036	6.007
Number of Executives Being Spun	2.70	2	2.39	1	12
Number of IPO Allocations	107.3	75.5	135.9	22	651
First Day Profit Aggregated Over All Executives ($)	1,691,210	1,026,816	2,017,477	285,320	9,301,421
Panel B: 16 SSB IPOs from 1996 to 2000					
First-Day Profit/Money Left on Table	0.040	0.005	0.081	0	0.323
Number of Executives Being Spun	3.63	3	3.46	1	16
Number of IPO Allocations	28.9.	10	40.1	3	164
First Day Profit Aggregated Over All Executives ($)	705,215	137,772	1,966,967	49,495	8,031,831
Average Spinning Period (Years)	2.19	2	1.05	1	4

The sample includes 20 companies conducting IPOs underwritten by CSFB and 16 companies conducting IPOs underwritten by SSB for which IPO allocation data for the executives being spun are available. The IPO allocation data for the 20 CSFB IPOs are from the March 7, 2003 *San-Jose Mercury News*. For the 16 SSB IPOs, the IPO allocation data are from the allocation lists for 48 SSB IPOs, as calculated by the authors. All measures are calculated based on each spinning firm. Shares of the executive's own firm that are allocated to the executive or his/her family members are excluded in the calculations. *Money left on the table* is defined as the first-day price change (offer price to close) times the number of shares issued, expressed in millions of dollars. *First-day profit* is the profit a firm's executives would have received if their allocated shares were sold at the first-day closing price. (This is the sum of these first-day profits over all of the IPOs received by all of the executives at the company.) The *number of IPO allocations* is the number of IPOs each spinning firm's executives that are involved in spinning received in the aggregate. For example, if three executives each received an allocation of each of five separate IPOs, we would count this as 15 allocations. The *average spinning period* in years is computed by averaging the number of years during which each executive received IPO allocations within each spinning firm. For this last variable, we only have data for SSB IPOs.

Table 1-4. IPO Allocation Statistics by Executive Position for 36 CSFB and SSB Spinning Companies

	Number of Executives	Number of Allocations		First-day Spinning Profits, $	
		Mean	Median	Mean	Median
Panel A: 20 CSFB IPOs from 1999 to 2000					
CEO	16	37.7	29	748,943	511,370
Chairman	1	56.0	56	538,243	538,243
President	0	n.a.	n.a.	n.a.	n.a.
CFO	14	34.6	35	612,688	522,948
Other Executives	23	44.0	36	553,271	483,504
Director	0	n.a.	n.a.	n.a.	n.a.
Total	54	40.2	36	626,374	522,745
Panel B: 16 SSB IPOs from 1996 to 2000					
CEO	14	10.1	7	257,489	57,523
Chairman	3	5.7	4	85,265	90,000
President	3	10.0	14	203,935	79,535
CFO	7	9.6	5	223,496	29,555
Other Executives	26	6.1	4.5	176,343	36,554
Director	5	9.4	10	132,455	104,042
Total	58	8.0	5	194,554	51,855
Panel C: 36 CSFB and SSB IPOs from 1996 to 2000					
CEO	30	24.8	24.5	519,598	312,960
All Others	82	22.7	18	360,005	215,737
Total	112	23.3	21	402,753	262,309

The sample includes 20 IPOs underwritten by CSFB and 16 IPOs underwritten by SSB for which subsequent IPO allocation data are available for 112 different executives who were spun. Executives holding multiple titles (e.g., CFO and VP-finance) are categorized based on their highest position, with the highest position assigned in this order: CEO, Chairman, President, CFO, Other Executive, Director. The names of the CSFB executives being spun, along with their number of allocations and first-day profits, are from the March 7, 2003 *San Jose Mercury-News*. The names of the SSB executives being spun are identified by matching information in the prospectuses with the names of accounts receiving allocations from the two SSB brokers who implemented spinning for the 48 IPOs for which we have allocation information.

Table 1-5. First-day Return OLS Regression for 196 IPOs with DMG, CSFB, or SSB as a Bookrunner, 1996-2000

Period	Intercept	ln(Assets)	ln(1+Age)	Tech Dummy	Internet Dummy	Share Overhang	VC Dummy	All-star Dummy	Spin Dummy	Bubble Dummy	Number of Obs	R^2_{adj}
(1) 1996-2000	-4.23 (-0.24)	-8.21 (-3.34)	6.78 (1.50)	20.66 (2.69)	12.89 (0.99)	7.14 (2.79)	14.53 (1.44)	--	--	29.60 (4.00)	196	26.9%
(2) 1996-2000	-6.47 (-0.36)	-8.63 (-3.45)	7.46 (1.64)	21.35 (2.76)	14.27 (1.10)	6.92 (2.68)	13.80 (1.36)	9.50 (0.97)	--	29.22 (3.91)	196	26.9%
(3) 1996-2000	-12.86 (-0.69)	-7.60 (-2.93)	8.00 (1.77)	16.14 (1.92)	13.81 (1.07)	6.67 (2.53)	12.17 (1.19)	9.89 (1.03)	22.68 (1.96)	29.93 (4.21)	196	28.3%
(4) 1996-1998	-3.85 (-0.34)	1.73 (1.25)	-0.07 (-0.02)	5.71 (1.12)	-10.52 (-1.49)	1.78 (1.55)	10.39 (1.53)	-5.22 (-1.33)	17.42 (2.76)	--	68	20.9%
(5) 1999-2000	12.16 (0.39)	-12.00 (-3.04)	8.74 (1.22)	32.96 (2.35)	9.83 (0.60)	8.12 (2.28)	10.45 (0.64)	16.10 (1.14)	26.36 (1.71)	--	128	18.9%

The sample in rows 1, 2, and 3 includes 196 firms taken public by 1) Deutsche Morgan Grenfell (DMG) from July 1, 1996 to June 30, 1998 for which the company's industry is technology or Internet-related; 2) Credit Suisse First Boston (CSFB) from July 1, 1998 to December 31, 2000 for which the company's industry is technology or Internet-related; or 3) Salomon Brothers from January 1, 1996 to November 1997, Smith Barney from July 1, 1997 to November 1997, and Salomon Smith Barney from November 1997 to December 31, 2000 (collectively, SSB). The 1996-1998 and 1999-2000 subperiods have average winsorized first-day returns of 16.5% and 75.3%, respectively. The dependent variable in all regressions is the percentage *first-day return* from the offer price to the first-day closing price, winsorized at the 1st and 99th percentiles (using the entire 1996-2000 IPO population cutoffs). *Ln(assets)* is the natural logarithm of the pre-issue book value of assets, expressed in millions of dollars of 2003 purchasing power using the CPI. *Ln(1+age)* is the natural logarithm of one plus the IPO year minus the founding year. The *tech* dummy takes a value of one (zero otherwise) if the firm is in the technology business, and the *Internet* dummy is similarly defined. *Share overhang* is the ratio of retained shares to the public float (the number of shares issued). The *VC* dummy takes a value of one (zero otherwise) if the IPO was backed by venture capital. The *All-star* analyst dummy takes a value of one if one or more of the bookrunners had an *Institutional Investor* all-star analyst (top 3) cover the stock within 12 months of the IPO. The *spin* dummy takes a value of one (zero otherwise) if the IPO is one of the 56 IPOs during 1996-2000 for which the executives of the IPO firm received IPO allocations from DMG, CSFB, or SSB, and one or more of these three underwriters was a bookrunner on their IPO. The *bubble* dummy takes on a value of one (zero otherwise) if the IPO occurred during 1999-2000. Heteroskedasticity-consistent *t*-statistics are in parentheses.

Table 1-6. First-day Return OLS Regression for 2,285 IPOs, 1996-2000

Period	Intercept	Top-Tier Dummy	ln(Assets)	ln(1+Age)	Tech Dummy	Internet Dummy	Share Overhang	VC Dummy	All-star Dummy	Spin Dummy	Unknown Spin Dummy	Bubble Dummy	R^2_{adj}
(1) 1996-2000	2.02 (0.76)	7.63 (3.46)	-2.69 (-4.73)	-0.62 (-0.76)	3.72 (2.03)	28.42 (6.27)	5.73 (8.97)	6.62 (2.85)	--	--	--	19.21 (7.65)	28.6 %
(2) 1996-2000	4.35 (1.62)	5.49 (2.51)	-3.32 (-5.60)	-0.63 (-0.77)	3.99 (2.17)	27.85 (6.21)	5.38 (8.61)	6.64 (2.87)	15.15 (4.47)	--	--	18.49 (7.42)	29.5 %
(3) 1996-2000	-1.94 (-0.34)	5.40 (2.44)	-3.26 (-5.54)	-0.56 (-0.68)	3.66 (2.00)	27.54 (6.15)	5.34 (8.52)	6.33 (2.74)	15.20 (4.48)	27.81 (2.64)	6.34 (1.25)	18.50 (7.46)	29.9 %
(4) 1996-1998	4.27 (1.21)	3.37 (2.49)	-2.08 (-5.23)	-0.35 (-0.66)	2.04 (1.54)	30.43 (3.88)	2.57 (5.79)	-2.11 (-1.29)	8.18 (3.27)	16.07 (2.39)	8.93 (2.84)	--	15.5 %
(5) 1999-2000	-11.95 (-1.00)	16.62 (2.61)	-4.78 (-3.32)	-0.05 (-0.02)	17.69 (3.42)	15.86 (2.59)	7.50 (6.78)	18.22 (3.52)	18.45 (2.92)	27.52 (1.91)	8.16 (1.02)	--	22.1 %

The sample in rows 1, 2, and 3 includes 2,285 operating firm IPOs from 1996 to 2000 for which the offer price is at least $5.00 and complete data on all of the variables are available. Unit offers, ADRs, banks and S&Ls, and partnership offers are excluded. The subperiods have 1,426 and 859 observations with winsorized average first-day returns of 16.8% and 61.8%, respectively, with an average over the entire sample of 33.7%. The dependent variable in all regressions is the percentage first-day return from the offer price to the first-day closing price, winsorized at the 1st and 99th percentiles. The *top-tier* underwriter dummy takes a value of one if the lead underwriter has an updated Carter and Manaster (1990) rank of 8 or more, and zero otherwise. The unknown spin dummy is one for firms whose spinning status is unknown (all but the 196 IPOs used in Table 4) and zero otherwise. Heteroskedasticity-consistent *t*-statistics are in parentheses.

Table 1-7. Two-stage Regression Results

Variable	First Stage: Spin Probit	First Stage: Underpricing OLS	Second Stage: Spin Probit	Second Stage: Underpricing OLS
Constant	-1.73	-28.41	-1.68	10.13
	(-2.25)	(-1.02)	(-2.19)	(0.39)
ln(Assets)	-0.10	-6.65	-0.09	-4.55
	(-1.22)	(-2.02)	(-1.18)	(-1.16)
ln(1+Age)	-0.13	8.01	-0.14	11.54
	(-0.73)	(1.27)	(-0.82)	(1.67)
Tech Dummy	1.04	19.83	1.04	-3.90
	(2.91)	(1.65)	(2.74)	(-0.22)
Internet Dummy	0.11	17.18	0.05	14.88
	(0.42)	(1.52)	(0.18)	(1.29)
VC Dummy	0.10	9.89	0.05	8.49
	(0.33)	(0.82)	(0.17)	(0.69)
Share Overhang	0.03	6.65		5.88
	(0.67)	(3.03)		(2.54)
All-Star Dummy	0.05	11.91		10.90
	(0.21)	(1.22)		(1.08)
Bubble Dummy	-0.19	26.41		30.88
	(-0.67)	(2.34)		(2.60)
Instate Dummy	0.47	10.44	0.45	
	(1.97)	(1.01)	(1.88)	
Low Ethics Dummy	1.06	23.38	1.02	
	(2.53)	(1.35)	(2.34)	
Pre-IPO Insider Holdings	0.71	20.86	0.68	
	(1.65)	(1.33)	(1.56)	
Capex/Assets	1.27	5.87	1.25	
	(1.35)	(0.15)	(1.34)	
Sales Growth	-0.001	-0.03	-0.001	
	(-0.42)	(-0.60)	(-0.34)	
Underpricing Instrument			0.001	
			(0.22)	
Spinning Instrument				22.69
				(2.01)
Test of of Underpricing	χ^2=0.81	F=7.51		
Identifying Variables	*p*-value=0.848	*p*-value=0.0001		
Test of Spinning	χ^2=13.17	F=1.05		
Identifying Variables	*p*-value=0.022	*p*-value=0.387		
Number of Obs	196	196	196	196
Pseudo or Adjusted R^2	21.0%	27.0%	20.7%	28.4%

The sample consists of 196 operating company IPOs underwritten by DMG, CSFB, and SSB from 1996 to 2000. See Tables 1-5 for common variable definitions. For IPOs underwritten by DMG or CSFB, *instate* is one if the IPO firm is located in California and for IPOs underwritten by SSB, *instate* is one if the IPO firm is in New York and zero otherwise. The *low ethics* dummy equals one (zero otherwise) if the firm engaged in option backdating or if the firm has a probability of backdating greater than 95%. *Pre-IPO insider holdings*, expressed as a decimal, is pre-issue shareholdings of "all executive officers and directors as a group" relative to all pre-issue shares outstanding reported in the prospectus. *Capex/Assets* is the ratio of the capital expenditure to total assets from the most recent fiscal year before the IPO. *Sales growth* is measured as the change in sales over the two most recent fiscal years before the IPO as a fraction of the year t-2 sales. The *underpricing instrument* is the fitted value from the first-stage underpricing OLS regression. The *spinning instrument* is the fitted value from the first-stage spinning probit regression. The test of identifying variables is either a Wald *chi*-squared test or an *F*-test of the null hypothesis that the coefficients of the identifying variables are all zero. The *t*-statistics for the OLS regression and the *z*-statistics for the probit regression reported in parentheses in the second stage are corrected for estimation error in the first stage based on Maddala (1983).

Table 1-8. First SEO and non-SEO Bookrunner Choice Comparison

	Comparison of Loyalty between Spinner and Non-Spinner				
	Companies that were Spun			Companies that were not Spun	
	Number	Percentage		Number	Percentage
Panel A: First SEO transaction					
Fired or demoted lead underwriter	1	5.6%		11	30.6%
Used the same lead underwriter	17	94.4%		25	69.4%
Two Sample *t*-Statistics			2.14		
(*p*-value)			(.037)		
Panel B: First non-SEO transaction					
Fired or demoted lead underwriter	16	53.3%		45	63.4%
Used the same lead underwriter	14	46.7%		26	36.6%
Two Sample *t*-Statistics			0.94		
(*p*-value)			(.351)		

This table compares the loyalty status of the 196 sample IPOs underwritten by DMG, CSFB, and SSB that have conducted post-IPO investment banking transactions. Panel A includes 54 of the 196 IPO firms that have conducted a public seasoned equity offering (SEO) by the end of 2001, categorized by the 18 companies that were spun and 36 that were not among the 54 SEO issuers. Panel B includes 101 of the 196 IPO firms that have conducted at least one non-SEO transactions, either a public/private debt offering, a private equity offering, or an M&A deal, by the end of 2001. Of the 101 first non-SEO transactions, 85 are M&A deals (IPO firm as acquirer or target), 8 are public debt offerings, 5 are private debt offerings, and 3 are private equity offerings. If the firm used the same bookrunner for their IPO and their first SEO (Panel A) or first non-SEO (Panel B) transaction, they belong to the group of Used the Same Lead Underwriter. If they used a different underwriter or the IPO underwriter is involved in the deal but not as the bookrunner, they belong to the category of Fired or Demoted (IPO lead underwriter is a member of the SEO underwriting syndicate, but not a bookrunner) Lead Underwriter. All post-IPO transaction data come from the Thomson Financial SDC database. The two sample *t*-statistics tests the hypothesis that the probability of using the same lead underwriter for the first SEO or first non-SEO transaction is the same for both spinning companies and nonspinning companies assuming equal variances.

CHAPTER 2
LOCAL UNDERWRITER OLIGOPOLIES AND IPO UNDERPRICING

Motivation

The average initial public offering (IPO) in the U.S. during 1993–2008 had a first-day return of 24%, despite the large number of underwriters competing for deals. The coexistence of many underwriters and high underpricing raises many questions. For instance, from the supply side, when underwriters have many peers to compete with, can they still win business while leaving large amounts of money on the table?[1] From the demand side, since issuers have many underwriters to choose from, why do they hire underwriters that result in such large foregone proceeds?

The IPO underwriting market is characterized by many competing underwriters and no obvious large barriers to entry, typifying a perfectly competitive market. However, perfect competition is inconsistent with the high underpricing observed, which suggests that this structure does not correctly describe the IPO underwriting market.

In this paper, we develop a theory of IPO underpricing that resolves this inconsistency. We posit that issuers care not only about IPO proceeds, but also about non-price dimensions of IPO underwriting such as underwriter quality, industry expertise, and analyst coverage from influential analysts. Alternatively stated, underwriters are selling differentiated products. Since a limited number of underwriters can provide these services for a given company, the IPO underwriting market is best characterized as a series of local oligopolies.

We model the supply side of the IPO underwriting market as composed of a large number of competitive underwriters and, on any given deal, a small number of underwriters with market power. This market power arises from the desire of issuing firms for research coverage by

[1] Money on the table is defined as the number of shares issued multiplied by the difference between the first closing market price and the offer price. It is the dollar value of underpricing.

influential analysts, with this analyst coverage bundled with underwriting. The equilibrium of the noncooperative repeated game generates several testable implications. The model predicts that the existence of oligopolistic underwriters exercising their market power results in greater underpricing for the issuers that are less focused on maximizing IPO proceeds. Furthermore, the model predicts that the underpricing attributable to the non-price dimensions varies with the value and the cost of providing these services, the deal frequency, and the issuer's willingness to pay for the non-price dimensions.

The model also generates a new theory of the underpricing of venture capital-backed IPOs: the analyst lust theory. We posit that venture capitalists (VCs) are rationally focused on the market price on the day when shares in the company are distributed to limited partners, which is typically six months to one year after the IPO. We assume that this market price is boosted by coverage from influential analysts, which we measure by using the "all-star" designation in the October issue of *Institutional Investor* magazine. Because of their concern with this price, VCs have a greater lust for all-star analyst coverage that is bundled with IPO underwriting, resulting in greater underpricing for VC-backed IPOs with all-star analyst coverage.

Empirically, we find that issuers using a bookrunner that bundles underwriting with influential analyst coverage are subject to 9% more underpricing during 1993–2008.[2] We also find that the incremental underpricing associated with all-star analyst coverage is higher for issuers that perceive all-star analyst coverage as more valuable and during periods when all-star analyst coverage is more important. Moreover, we find that the effect of all-star analyst coverage on underpricing is lower in periods when the IPO volume in an industry is low.

[2]All bookrunners are lead underwriters, but not all lead underwriters are bookrunners. The bookrunner (or bookrunners) is in charge of allocating shares, especially to institutional investors, although some of this activity may be delegated to the other underwriters in a syndicate. We use the terms (lead) underwriter and bookrunner interchangeably in much of the paper.

Using venture capital-backing as a proxy for a greater willingness to pay for coverage from an influential analyst, we find that VC-backed issuers have 20% more underpricing (e.g., 38% rather than 18%) when they have all-star coverage than when they do not, holding other things constant. Moreover, when the relation between VC-backing and all-star analyst coverage is controlled for, the effect of VC-backing itself on underpricing is reduced by more than 50%, suggesting that most of the effect of VC-backing on underpricing is due to the greater focus by venture capitalists on all-star analyst coverage. Surprisingly, there is no reliable relation between all-star analyst coverage and underpricing for non-VC-backed IPOs.

Our model also generates predictions regarding other non-price dimensions. For example, our model predicts that underwriters possessing an attribute valued by issuers, such as industry expertise, will be able to underprice more. When we test this prediction using IPOs from 1980–2008, we find that issuers that hire an underwriter with more industry experience are underpriced by 3–5% more. Based on our model, we also construct an issuer-specific Herfindahl-Hirschman Index (HHI) measure of the market share concentration of the underwriters that the issuer is likely to hire. The HHI measure is used to proxy for non-price dimensions that are not explicitly accounted for. Consistent with our prediction, we find that this measure is positively associated with IPO underpricing. Additionally, we use top-tier underwriter status to proxy for other services that high quality underwriters provide. Consistent with prior findings, we find that prestigious lead underwriters are associated with less underpricing during the 1980s, but with more underpricing in later periods. We interpret this pattern as being consistent with the evolution of the IPO underwriting market from competing on the basis of maximizing IPO proceeds, which we label the price dimension, to competing on non-price dimensions.

When we examine VC-backed and non-VC-backed IPOs separately, the findings suggest that underwriter competition in these two markets focuses on different non-price dimensions, further highlighting the special pricing objectives of the VCs. Finally, in assessing the economic importance of the non-price dimensions, we find that their combined effect can account for 30% of the average underpricing.

Our paper is related to a large literature on IPO underpricing. Most theoretical models of IPO underpricing focus on two types of interactions, either between the underwriter and investors or between the underwriter and the issuer. The first kind of interaction is exemplified in Rock (1986), Benveniste and Spindt (1989), and Welch (1992), in which the underwriter needs to underprice shares in order to induce investors to participate in IPOs. By contrast, Baron (1982), Loughran and Ritter (2002, 2004), and Ljungqvist and Wilhelm (2003) focus on the interaction between the underwriter and the issuer. These latter articles assume that underwriters want to underprice IPOs more than is needed and focus on cross-sectional differences in the desire of issuers to minimize underpricing. In particular, Loughran and Ritter (2004) explain why an issuer would knowingly hire an underwriter that in expectation will excessively underprice its IPO, but they do not explain why competition between underwriters does not lower the expected underpricing to competitive levels.

A common feature in all of the above-mentioned articles is that interactions between competing underwriters do not come into play. In other words, the supply of underwriting services is not modeled. In this paper, we explicitly account for interactions between competing underwriters and develop a new theory of IPO underpricing in which there is excessive underpricing in equilibrium.

The Model

The Objectives of Underwriters and Issuers

Objectives of underwriters

A number of papers model an imperfectly competitive underwriting market in an attempt to explain IPO underpricing (e.g., Fu and Li, 2007; and Hoberg, 2007) and/or the clustering of gross spreads (e.g., Gordon, 2003; Chen, 2008; and Lowery, 2008). Most of these models use a game-theoretic framework and rely on assumptions such as heterogeneously informed underwriters or capacity constraints and barriers to entry in the IPO underwriting industry to produce an equilibrium with tacit (implicit) collusion among underwriters.

Unlike these models, we focus on differentiated IPO underwriting services and localized competition in the IPO underwriting market. Thus, we assume that only a subset of underwriters has some market power in each industry, and that only a subset of issuers is willing to pay for the differentiated product offered by these underwriters.

For our model, we follow recent papers and assume that underwriters want to underprice IPOs more than is needed. Underwriters can benefit from underpricing IPOs in several ways. First, underwriters can allocate underpriced shares to investors in exchange for soft dollar commission business (e.g., Loughran and Ritter, 2002, 2004; Reuter, 2006; Hoberg, 2007; and Nimalendran, Ritter, and Zhang, 2007). Goldstein, Irvine, and Puckett (2011) estimate that an additional $1 excess commission payment to the lead underwriter results in IPO share allocations that generate $2.21 in investor gross profits, implying that 45% of the money left on the table is captured by the underwriter. Second, underwriters can allocate underpriced IPOs to executives to sway their decision in choosing which investment banking firm to hire, a practice known as spinning (Liu and Ritter, 2010). Through these channels, underwriters can capture much of the money left on the table. Partly offsetting the benefits, a cost to underwriters of excessive underpricing is lower gross spread revenue, which is typically seven cents for every dollar decrease in the offer price for moderate-sized U.S. IPOs.

Although an underwriter would like to underprice IPOs, if issuers want to avoid excessive underpricing, an underwriter will win fewer IPO mandates if it underprices too much. From an underwriter's point of view, the profit-maximizing level of underpricing depends on the elasticity of demand for its services with respect to underpricing, which in turn depends upon the competitive environment that it faces.

Objectives of issuers

When choosing an IPO underwriter, issuers care about many dimensions of the underwriting service, which can be categorized into price and non-price dimensions.[3] The issuer's objective function can be expressed as:

$$\alpha_1 \cdot Net\ IPO\ proceeds\ + \sum_{i=2}^{n} \alpha_i X_i, \tag{2-1}$$

where the $Net\ IPO\ proceeds$ (number of shares offered times the net proceeds per share) represents the price dimension, the weights satisfy the condition that $\sum_{i=1}^{n} \alpha_i = 1$, and the X_is are the issuer's perceived value of the *n*-1 non-price dimensions such as underwriter quality, industry expertise, aftermarket price support, side payments to executives, commercial bank loan tie-ins, and analyst research coverage.

A special case of Equation 2-1 is analyzed by Loughran and Ritter (2004), where the issuer's objective function has three components:

$$\alpha_1 \cdot Net\ IPO\ proceeds + \alpha_2 \cdot Proceeds\ from\ future\ sales + \alpha_3 \cdot Side\ payments, \tag{2-2}$$

[3] The focus on price versus non-price dimensions has also been used to explain changes in the gross spreads on junk bonds. Livingston and Williams (2007) document that the gross spreads on junk bond offers were higher when Drexel Burnham Lambert was underwriting junk bonds in the 1980s than afterwards. They posit that after Drexel liquidated in 1990, the competition between underwriters became less focused on non-price dimensions bundled with underwriting and more focused on the fees, resulting in a drop in the gross spreads.

where $\alpha_1 + \alpha_2 + \alpha_3 = 1$. They assume that the proceeds from future sales are boosted by bullish coverage from influential analysts. Loughran and Ritter posit that there will be more underpricing when issuers place a positive weight on α_2 (the analyst lust hypothesis) or α_3 (the spinning hypothesis). Empirically, the analyst lust hypothesis is examined by Cliff and Denis (2004) and the spinning hypothesis is examined by Liu and Ritter (2010).

Most of the IPO literature has implicitly or explicitly assumed that the first term in Equations 2-1 and 2-2 is the only term that enters the objective function of issuers, suggesting that issuers seek to achieve the highest offer price possible. If issuers care about the non-price dimensions of IPO underwriting, however, then they are willing to use underpricing (i.e., agree to a lower offer price) to pay for these dimensions.[4]

In a survey of 336 chief financial officers (CFOs) who attempted to take their companies public in 2000–2002, Brau and Fawcett (2006, Table IV) report that the top three criteria that issuers use in selecting a lead IPO underwriter are, based on an importance scale of 1 (low) to 5 (high), the underwriter's overall reputation and status (4.39/5), the quality and reputation of the research department/analyst (4.25/5), and the underwriter's industry expertise and connections (4.24/5). Given these preferences, an underwriter's ability to win IPO mandates from firms in an industry partly depends on the expertise of its research analyst in that industry. By choosing the underwriter, the issuer can receive coverage from the underwriter's analyst who specializes in that industry, which is bundled with underwriting.[5]

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[4] We assume that the non-price dimensions are paid for through underpricing rather than explicit payments (the gross spread) given the evidence from Chen and Ritter (2000) that the gross spreads for almost all moderate-sized U.S. IPOs from 1990 to 1998 are clustered at exactly 7%. If underwriters can only capture part of the money left on the table, then charging through the gross spread appears to be a better way of collecting rents. One possible reason that non-price services are not paid for through the gross spread is that issuers do not regard opportunity costs (money left on the table) as equivalent to direct costs (gross spreads).

[5] Degeorge, Derrien, and Womack (2007) present evidence on the bundling of IPO underwriting and subsequent analyst coverage. Bradley, Jordan, and Ritter (2008, pp. 109–110) report that 98% of lead underwriters initiated

While our analysis can be extended to other non-price dimensions, we focus on all-star analyst coverage in the model. The empirical evidence on the market's reaction to coverage decisions suggests that it is rational for firms to value analyst coverage. The impact of analyst coverage on firm value can be estimated from the announcement effects of analyst initiation, stoppage, and resumption decisions. Bradley, Jordan, and Ritter (2008) report a 3% announcement abnormal return for firms with unanticipated analyst coverage initiations in the year after the IPO (exclusive of anticipated initiations at the end of the quiet period). Kelly and Ljungqvist (2007) and Khorana, Mola, and Rau (2009) show that firm value declines when a research analyst terminates coverage. When analysts resume the coverage of "neglected" stocks, Demiroglu and Ryngaert (2010) find that these stocks experience a 4.8% announcement abnormal return.

Analyst coverage can generate more publicity for a firm and increase the firm's visibility among institutional investors, which can drive up demand, thus increasing firm value in the short run. While the evidence suggests that analysts are valuable, some analysts are more influential than others. The most well-known analyst ranking is done by *Institutional Investor* magazine, which polls buy-side institutional investors every year to rank sell-side analysts. In October, the magazine publishes its All-America research team, which names the top three analysts and a few runners-up in each industry, where the top three analysts are designated as all-stars. Empirically, all-star analyst status has been used by many studies as a measure of analyst influence and is positively correlated with analyst pay and underwriting deal flow. Consequently, we use the *Institutional Investor* all-star designation as our measure of which analysts are most sought-after by issuing firms.

coverage within one year of the IPO for their sample IPOs in 1999–2000, and Gao, Ritter, and Zhu (2011) find that 98% of IPOs during 2001–2009 had coverage from a lead underwriter within one year of the IPO. Both of these papers restrict their samples to IPOs with a file price midpoint of at least $8 per share.

The Basic Model

Although there are many possible lead underwriters of IPOs, if issuing firms have a preference for coverage from an influential research analyst, and if analyst coverage is bundled with underwriting, then the small number of underwriters with the most influential analysts in a given industry will have some market power. In other words, even though the investment banking industry might be very competitive, if issuing firms have a preference for an underwriter with an influential analyst covering their industry, the underwriting industry will consist of a series of local oligopolies. We model one of the local oligopolies in an infinitely repeated game of issuers buying underwriting services. Our procedure is to solve for the cooperative outcome in a one-period model, and then state the necessary conditions for the one-period equilibrium to be supportable in an infinitely repeated noncooperative game.

The model starts with a single period, where a period denotes the length of time between IPOs in that industry. Suppose that there are N underwriters in the market and a unit mass of issuers. Issuers differ in their preference parameter θ, which is distributed uniformly on the $[0, 1]$ interval, and represents the relative importance of having all-star analyst coverage. For example, an issuer that intends to conduct a follow-on offering shortly after the IPO might have a high θ, whereas an issuer for which the insiders have no intention of selling shares during the next few years might have a low θ. θ is closely associated with the weight α_i that corresponds to coverage from an influential analyst in Equation 2-1 or the weight α_2 on future proceeds in Equation 2-2. The value of θ for each issuer is not observed by the underwriters, but the distribution of θ is public knowledge. Each issuer wants to buy one unit of underwriting service from a single underwriter. Of the N underwriters, three of them have an all-star analyst. The perceived effect on the market value of retained shares from being covered by an all-star analyst is given by A.

An issuer's net surplus from going public at underpricing level U is

$$M - U + \theta A, \tag{2-3}$$

where M is the market value of the shares being sold net of the gross spread (which is held constant across all issues) and U is the cost of going public in terms of the underpricing level in dollars (the money left on the table). The first part of the net surplus, $M - U$, is the net proceeds from selling a fixed number of shares at the initial public offering. The second part of the net surplus, θA, is the effect of all-star analyst coverage on value, A, multiplied by the issuer's preference for an all-star analyst, θ. Equation 2-3 is a special case of Equations 2-1 and 2-2. The specification is equivalent to an objective function that is a weighted average of firm value in periods 1 and 2 in a two-period model.

The profit to underwriter k is

$$\pi_k = (\gamma(U - \overline{U}) - C)D_k, \tag{2-4}$$

where $\overline{U}$ is the dollar amount of underpricing needed to compensate investors for the ex-ante uncertainty of issue valuation, which for simplicity is assumed to be the same across all issues (or, in our empirical work, is captured by control variables), and C is the cost of providing all-star analyst coverage (C = 0 when no all-star coverage is provided). D_k is the demand for underwriter k's service. The cost of underwriting the issue is assumed to be covered in the gross spread, which is taken as exogenous here. We assume that a fraction γ of the incremental money left on the table $U - \overline{U}$ flows back to the underwriters through indirect channels, such as collecting soft dollars from rent-seeking investors. We do not model IPO investors because the rest of the incremental underpricing, $(1 - \gamma)(U - \overline{U})$, goes to the investors, thus ensuring their participation.

If N is large, then the $N-3$ underwriters without an all-star analyst will not be able to charge $U > \overline{U}$ because they behave in a perfectly competitive market with a large number of underwriters and homogeneous services. Therefore, they will set $U = \overline{U}$. Notice that if none of the underwriters that are willing to do a deal has an all-star analyst, the entire underwriting market behaves like a perfectly competitive market.

Now we consider the level of underpricing that the three underwriters with an all-star analyst will charge. If the three underwriters do not cooperate, then under Bertrand competition, each of the three underwriters charges $U = \overline{U} + \frac{C}{\gamma}$ and obtains zero profit.[6]

If the three underwriters collude and charge the same level of underpricing $\dot{U}$ (where the dot notation indicates collusion values), then the aggregate demand for their service from a unit mass of issuers can be calculated by finding an issuer with parameter $\hat{\theta} \in [0, 1]$ that is indifferent between choosing an underwriter with or without an all-star analyst, which occurs when

$$M - \dot{U} + \hat{\theta}A = M - \overline{U}. \tag{2-5}$$

Thus, the aggregate demand is

$$\dot{D} = 1 - \hat{\theta} = 1 - \frac{\dot{U} - \overline{U}}{A}. \tag{2-6}$$

The underpricing level $\dot{U}$ that maximizes $\dot{\pi} = (\gamma(\dot{U} - \overline{U}) - C)\dot{D}$, the aggregate profit of the colluding underwriters, occurs when

$$\frac{\partial \pi}{\partial \dot{U}} = \gamma \dot{D} + (\gamma(\dot{U} - \overline{U}) - C)\frac{\partial \dot{D}}{\partial \dot{U}} = 0. \tag{2-7}$$

Differentiating Equation 2-6 with respect to $\dot{U}$ and substituting both this expression for $\frac{\partial \dot{D}}{\partial \dot{U}}$ and Equation 2-6 for $\dot{D}$ into Equation 2-7 and solving for $\dot{U}$ yields

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[6] Bertrand rather than Cournot competition is assumed because it is more natural to think of underwriters competing on price rather than on quantity since underwriters play an active role in setting prices.

$$\dot{U} = \overline{U} + \frac{\gamma A + C}{2\gamma}. \tag{2-8}$$

Substituting Equation 2-8 into Equation 2-6, the aggregate demand from the unit mass of issuers for underwriters offering all-star coverage is then $\dot{D} = 1 - \frac{\dot{U} - \overline{U}}{A} = \frac{1}{2} - \frac{C}{2\gamma A}$. Thus, only issuers with $\theta > \frac{1}{2} + \frac{C}{2\gamma A}$ will choose an underwriter with an all-star analyst. Intuitively, the collusive equilibrium (monopoly) profits of the underwriters has marginal revenue equal to marginal cost with only the minority of issuers with a sufficiently high θ choosing an underwriter with an all-star analyst. The aggregate profit of the three underwriters is

$$\dot{\pi} = \left(\gamma\left(\dot{U} - \overline{U}\right) - C\right)\dot{D} = \frac{\gamma A}{4} - \frac{C}{2} + \frac{C^2}{4\gamma A}, \tag{2-9}$$

which is greater than zero as long as $A > \frac{C}{\gamma}$. Thus, each of the three underwriters earns $\dot{\pi}/3$ or one-third of the monopoly profit and each has $\frac{1}{6} - \frac{C}{6\gamma A}$ of the market in the collusive outcome.

Although the collusive equilibrium maximizes their joint profits, each of the three underwriters has an incentive to undercut the other two and capture a larger market share. Generally, in an infinitely repeated game, each underwriter decides whether to cooperate by evaluating the following equation:

$$PV^{No\ Coop} = \pi_D + \pi_N\left(\frac{1}{1+i} + \frac{1}{(1+i)^2} + \cdots\right) \leq \frac{1}{M}\dot{\pi}\left(1 + \frac{1}{1+i} + \frac{1}{(1+i)^2} + \cdots\right) = PV^{Coop}, \tag{2-10}$$

where π_D is the one-time deviating profit, π_N is the profit after deviation detection, i is the discount rate, and M is the number of underwriters sharing the monopoly profit, which is three in our case. Note that the right-hand side of Equation 2-10 decreases with increasing M, which makes cooperation less attractive. This is where localized competition is important because it results in M being much smaller than the total number of underwriters N.

Game theory's folk theorem states that the cooperative outcome of the single-period game can be sustained in an infinitely repeated noncooperative game with a trigger strategy that makes π_N low, provided that there is a sufficiently low discount rate i to satisfy Equation 2-10.

In our model, the ability of the oligopolists to penalize a deviating underwriter is complicated by the fact that the observable underpricing is a stochastic outcome of expected underpricing. Thus, a grim trigger strategy involving the end of cooperation when a lower than $\dot{U}$ level of underpricing is observed is not desirable since a random shock could create lower underpricing and trigger noncooperation forever thereafter. A more implementable trigger strategy as described in Green and Porter (1984) is that the underwriters enter into a punishment state for a finite number of periods after observing a previously agreed-upon value in a trigger set. This finite punishment prevents the underwriters from entering into a punishment phase forever due to a random shock. Furthermore, the punishment could be triggered only if underpricing is sufficiently low (not merely less than $\dot{U}$). [7] Moreover, it could be conditioned on information about each underwriter's market share.[8]

With such a trigger strategy, the three underwriters can maintain the collusive underpricing level given a sufficiently low discount rate i.[9] In such a case, the three underwriters with all-star analysts in an industry form a local oligopoly and earn oligopoly profits. This is possible because

[7] It is reasonable to assume that the issuer makes the underwriter choice subject to some noise, as in Hoberg (2007), since the underpricing U is not perfectly observed before the issuer chooses an underwriter. This suggests that charging a level of underpricing just below the collusive underpricing $\dot{U}$ will not be enough to win all business from other underwriters. Thus, a deviating underwriter needs to charge a sufficiently lower underpricing than $\dot{U}$ so that issuers may respond. The lower underpricing needed not only limits the potential gain from deviation, but also facilitates detection.

[8] Even though the trigger set can only contain imperfectly correlated public signals of the underwriter's actions, what is important is that the underwriters know a deviation on their part increases the probability of detection, thus deterring them from cheating. Also, including additional information such as the underwriter's market share in the trigger set increases the strength of the signal and facilitates detection.

[9] Indeed, the equilibrium discussed is not unique as any level of profit can be supported up to the monopoly level with sufficient cooperative conditions. However, the equilibrium we discuss yields the maximum profit for the three underwriters, and thus is of more interest than other equilibria.

some issuers view having an all-star analyst to be an important part of their objective function, and analyst coverage is bundled with underwriting. Because of this feature, the underwriting market changes from a perfectly competitive market to a market composed of a perfectly competitive submarket and local oligopolies of underwriters that have an all-star analyst in a specific industry.

From the basic model, we derive the following six implications concerning IPO underpricing:

1. Underpricing implication: Issuers that choose an underwriter with an all-star analyst are more underpriced than issuers that choose an underwriter without an all-star analyst.

This implication follows from the model where the underwriter with an all-star analyst charges $\dot{U} = \overline{U} + \frac{\gamma A + C}{2\gamma}$ and the underwriter without an all-star analyst charges $U = \overline{U}$.

2. Differential analyst influence implication: The underpricing charged for having an all-star analyst is higher for issuers with a higher perceived effect of all-star analyst coverage, A, and is higher in periods when all-star analyst coverage is more important.

The underpricing difference between underwriters with and without an all-star analyst in the issuer's industry is $\frac{\gamma A + C}{2\gamma}$. The difference increases with A, where A can vary in both the cross-section and time series.

3. Coverage cost implication: As the cost of all-star analyst coverage increases, the underpricing charged for having an all-star analyst increases.

The underpricing difference between underwriters with and without an all-star analyst in the issuer's industry is $\frac{\gamma A + C}{2\gamma}$. As C increases, the difference increases.

4. Analyst turnover and deal frequency implication: Excess underpricing is lower when a) all-star analyst turnover is high, or b) the frequency of deals in the industry is low, providing there is persistence of turnover and deal frequency.

If there is less than perfect autocorrelation of having an all-star analyst from year to year, the discount rate i for computing the present value of underwriter profits in Equation 2-10 is equal to the relevant required return plus the per-period probability of losing an all-star analyst (i.e., i is the sum of the required return plus the decay rate). When the deal frequency is low, the discount rate per period, where a period is defined as the length of time between IPOs in an industry, is large. Thus, the discount rate i is larger the less frequent are deals in a given industry and the less persistent is the all-star status for a given underwriter's analyst. When the discount rate i exceeds a critical value, the present value condition to sustain the oligopolistic equilibrium is no longer satisfied. Thus, the ability of underwriters to charge higher underpricing disappears when the frequency of deals or the persistence of all-star status is low.

5. Underwriter concentration implication: The average underpricing and the Herfindahl-Hirschman Index (HHI) measuring underwriter concentration for an industry both increase as the effect of all-star analyst coverage, A, increases.[10] Thus, HHI and underpricing should be positively correlated cross-sectionally.

The average underpricing for the industry is $U_{Avg} = (\frac{1}{2} - \frac{C}{2\gamma A})(\overline{U} + \frac{\gamma A + C}{2\gamma}) + (\frac{1}{2} + \frac{C}{2\gamma A}) \overline{U}$,

which is increasing in A. The HHI for the industry is $\frac{1}{3}(\frac{1}{2} - \frac{C}{2\gamma A})^2 + \frac{1}{N-3}(\frac{1}{2} + \frac{C}{2\gamma A})^2$, which is increasing in A for $A > \frac{CN}{\gamma(N-6)}$. Holding other parameters constant, suppose we have two industries, where the value of a non-price dimension in industry 1 is A_1, the value of a non-price dimension in industry 2 is A_2, and $A_1 < A_2$. Consequently, we have $HHI_1 < HHI_2$ and $U_{Avg_1} < U_{Avg_2}$.

Perfectly Observed Willingness to Pay

In the basic model, we assume that the distribution of θ is known, but an individual issuer i's preference or willingness to pay for all-star analyst coverage, θ_i, is unobserved. Here, we

[10] The HHI for an industry is the sum of the squared market shares of the underwriters in that industry, and is bounded above by 1.0 for a monopolistic industry and is bounded below by zero for an industry composed of atomistic competitors.

consider the case in which the values of θ_i are perfectly observable by the underwriters and derive the following implication:

6. Willingness to pay implication: If issuers' willingness to pay can be inferred by the underwriters, the level of underpricing an issuer pays for all-star analyst coverage is proportional to its willingness to pay.

The $N - 3$ underwriters without an all-star analyst still charge underpricing of $\overline{U}$ as in the basic model. For the three underwriters with an all-star analyst, if they can observe the issuer's willingness to pay, they will price discriminate and charge U_i for issuer i so that the issuer's surplus from choosing an underwriter with an all-star analyst is the same as its surplus from an underwriter without an all-star analyst, such that

$$M - U_i + \theta_i A = M - \overline{U}. \tag{2-11}$$

Solving for U_i in Equation 2-11 yields

$$U_i = \overline{U} + \theta_i A. \tag{2-12}$$

At this underpricing level, the underwriter only underwrites issuers with $\theta_i > \frac{C}{\gamma A}$, for which the underwriter's profit, $\pi = (\gamma(U_i - \overline{U}) - C)D_i$, is greater than zero. Due to the cost of all-star analysts, it is not in the best interest of the underwriters to provide underwriting service coupled with all-star analyst research coverage to all issuers in a given industry. Since underwriters charge $U_i = \overline{U} + \theta_i A$, an issuer with a higher θ_i pays a higher U_i than an issuer with a lower θ_i.

Issuers with a greater willingness to pay for all-star coverage (a high θ_i) may include those IPOs that are VC-backed. Venture capitalists are rationally focused on post-issue coverage because they typically invest in young companies with a high ratio of growth opportunities to assets in place, do not sell shares in the IPO, and then make distributions to their limited partners beginning when the "lock-up" period expires, usually 180 days after the IPO. A common measure of the performance of venture capitalists is the internal rate of return realized by their limited partners, calculated using the market price on the distribution dates. Importantly, unlike corporate executives, both the limited partners and general partners of venture capital firms frequently sell most or all of their shares in a portfolio company on or shortly after the distributions. Consequently, they are much more focused on the intermediate-term stock price than on the long-run performance of the company. Thus, based on our willingness to pay implication, we propose a new theory of the underpricing of VC-backed IPOs: the analyst lust theory.[11]

- **Analyst lust theory of the underpricing of VC-backed IPOs:** Because venture capitalists have a greater preference for all-star analyst coverage that is bundled with IPO underwriting, IPOs with all-star analyst coverage should have greater underpricing if they are VC-backed than if they are not.

In contrast to our analyst lust theory's prediction that VC-backed IPOs should have higher underpricing, the certification theory predicts less underpricing for VC-backed IPOs because VC-backing can certify the fairness of IPO pricing due to reputation concerns (e.g., Barry, Muscarella, Peavy, and Vetsuypens, 1990; Megginson and Weiss, 1991; Li and Masulis, 2007; and Krishnan, Ivanov, Masulis, and Singh, 2011).

Additionally, two more papers discuss the underpricing of VC-backed IPOs. The grandstanding theory predicts that young VCs are more likely to bring their portfolio companies to the market sooner (Gompers, 1996). Combined with the hypothesis that underpricing compensates for risk, the grandstanding theory predicts more underpricing for the IPOs of younger venture capital organizations.[12] The grandstanding theory generates a cross-sectional

[11] Loughran and Ritter (2004) coined the term "analyst lust" to identify the willingness of issuing firms to forego IPO proceeds in order to attain coverage from an all-star analyst employed by the IPO underwriter. They posit that firms for which there are high growth opportunities relative to the value of assets in place would be more focused on analyst coverage. Unlike us, they do not identify VC-backed issuers as those that are particularly focused on analyst coverage due to the importance of the distribution date.

[12] This effect should be mitigated in regressions that include other risk proxies such as ln(assets) and tech and Internet dummies. Table 5 of Gompers (1996) reports that, controlling for other firm characteristics, there is more underpricing for IPOs backed by less experienced venture capitalists.

prediction, but does not necessarily make a prediction regarding the underpricing of VC-backed IPOs relative to other IPOs. Another paper, by Hoberg and Seyhun (2009), posits that VC-backed IPOs will be underpriced more than other IPOs, but their rationale is different from ours—they assume that venture capitalists exchange favors with underwriters, whereas our game-theoretic model does not involve any quid pro quo arrangement between these players.

Model Extensions

The simple model above focuses on the pricing of all-star analyst services. Similar reasoning can be made for the other non-price dimensions considered in the issuer's objective function in Equation 2-1, such as industry expertise, aftermarket support, side-payments (spinning), the quality of the underwriter, or commercial bank loans that are bundled with underwriting. There are, however, some distinctions. Although there are costs of providing these other services, the barriers to entry may not be as restrictive as is the case for analysts, as the number of underwriters with an all-star analyst in a particular industry is, by the convention of *Institutional Investor*, limited to at most three at a time.

Data

The full sample is composed of 7,319 U.S. IPOs from 1980–2008 meeting criteria that are common in the empirical IPO literature. The tests in Section 5 that involve all-star analysts are conducted on a subsample of 4,510 IPOs that starts in 1993 because our all-star analyst coverage variable is available only for years 1993–2008, mainly due to the availability of Thomson Reuters's I/B/E/S recommendations database starting in year 1993.[13]

[13] I/B/E/S is far from comprehensive in its analyst recommendations file. In collaboration with Dan Bradley, Jonathan Clarke, Lily Fang, Ayako Yasuda, and others, we augment I/B/E/S recommendations from lead underwriter analysts in the year following the IPO with information from Bloomberg, Briefing.com, First Call, Investext, and online searches to identify initiations.

The IPO data are from Thomson Financial's new issues database with hundreds of fill-ins of missing data and corrections based upon information from Dealogic for 1990–2008, the Graham Howard-Todd Huxster set of IPO prospectuses from 1975–1996 given to Jay Ritter, EDGAR for 1996–2008, and other sources. We exclude closed-end funds, REITs, SPACs, ADRs, banks and S&Ls, unit offers, partnerships, IPOs with an offer price of less than $5.00 per share, and IPOs not listed on CRSP within six months of issuing. We also exclude 22 IPOs using auctions rather than bookbuilding because of the lack of underwriter discretion in allocating shares. Table 2-1 provides a detailed description of the variables used in our analysis, and a listing of the data sources.

The Nature of the IPO Underwriting Market's Competitive Environment

Before testing the model implications, it is worth noting several aspects of the IPO underwriting market that are suggestive of its competitive structure and the evolution of this structure over time. The patterns are documented in Figure 2-1 through Figure 2-3.

First, for moderate-size IPOs, there is little competition on the basis of gross spreads. In all but one year beginning in 1995, 90% or more of moderate-size IPOs have paid gross spreads of exactly 7%. The clustering at 7% is the basis for our model's treatment of the gross spread as exogenous and underpricing as endogenous.

Second, top-tier underwriters (those with a Carter-Manaster rank of 8 or above) are able to provide many ancillary services. The market share of IPO lead underwriter positions for the 20 or so top-tier underwriters has been over 50% in every year since 1985, and over 70% in every year beginning in 1999.

Third, there has been an uptrend in the number of managing underwriters and the number of bookrunners per IPO. One of the reasons for adding more managers is to secure more analyst coverage.

All three of these patterns are consistent with the view that underwriters compete on non-price dimensions to win business.

All-star Analyst Coverage

In the empirical analysis, we focus on the all-star analyst dimension because it is narrow and well-defined, thus providing a good setting to test our model implications. However, we test the main model underpricing implication on other non-price dimensions in Section 6 to demonstrate the applicability of our theory beyond the all-star analyst dimension.

In this section, we test the five model implications concerning the relation between all-star analyst coverage and underpricing. In particular, we test whether IPOs with all-star analyst coverage from a lead underwriter are more underpriced than those without (*underpricing implication*). We also test whether all-star analyst coverage is associated with more underpricing when all-star analyst coverage has a greater effect on value (*differential analyst influence implication*) or when the cost of all-star analyst coverage is higher (*coverage cost implication*). In addition, we test whether the underpricing associated with all-star analyst coverage is lower in periods when there are few deals (*deal frequency implication*). We do not test whether underpricing is lower when all-star analyst turnover is higher (*analyst turnover implication*) because there is insufficient time-series variation in analyst turnover. Lastly, we test whether issuers with a higher willingness to pay for all-star analyst coverage have even more underpricing (*willingness to pay implication*). We identify issuers with a greater willingness to pay as those that are VC-backed, based on our analyst lust theory of VC-backed IPOs.

The All-star Analyst Coverage Variable

By far the best measure of who institutional investors consider to be the most influential analysts covering specific industries is the annual ranking in *Institutional Investor* (*II*) magazine's October issue. Following a survey of buy-side institutional investors during the summer, *II* publishes a listing of the top three analysts in each of approximately 70 industries, along with a few analysts per industry who are designated as "runners up." The industries vary from year to year. For example, in 1993 there was no separate "Internet" industry, whereas in the last decade of our sample period there is. There are approximately 3,000 sell-side analysts each year during our sample period, and with only three individuals in each of about 70 industries being designated as all-stars, less than 10% of sell-side analysts achieve this designation in any given year.

The *II* all-star ranking has been used in Dunbar (2000), Cliff and Denis (2004), Clarke, Khorana, Patel, and Rau (2007), Fang and Yasuda (2009, 2010), Hao (2011), Liu and Ritter (2010), and other articles as a measure of influence. In this paper, we construct our all-star analyst coverage variable as a dummy that equals one if an all-star analyst (top three) from a lead underwriter has covered the stock within a year after its IPO, and zero otherwise. For IPOs in year t, we use the October issue of *II* for year t-1 to classify IPOs as to whether coverage from a lead underwriter was provided by an all-star analyst.

In untabulated analysis, we calculate the probability of retaining all-star status in year t+1 if an analyst was an all-star in year t, for t=1983–2007. We find that 75% of all-stars (top three) in year t repeat as an all-star in year t+1. Of the 25% of all-stars who do not repeat, approximately half drop to runner-up status and the other half drop off the list, in some cases because of retirement or movement to the buy side. These probabilities are similar to the numbers reported by Fang and Yasuda (2010).

The Effect of All-star Coverage on Underpricing

To test the *underpricing implication*, we estimate the quantitative effect on IPO underpricing of all-star analyst coverage while holding other variables constant. Table 2-2 presents ordinary least squares (OLS) regressions in which the level of underpricing (the percentage first-day return from the offer price to the closing price) is the dependent variable. We use the firm characteristic variables ln(assets), an Internet dummy, and a venture capital (VC) dummy as control variables. In addition, we include share overhang, defined as the ratio of retained shares to the public float (shares issued), as an additional control variable (see Bradley and Jordan, 2002). This variable captures both incentive effects and valuation effects.[14] We also include industry fixed effects based on 49 Fama-French (1997) industries and year fixed effects in all but the first two regressions.[15] To account for error dependencies across industry and year, the standard errors are adjusted for two-dimensional clustering at the industry and year level.

The main variable of interest is an all-star analyst coverage dummy, equal to one if the company is covered by an *Institutional Investor* all-star analyst employed by a bookrunner within 12 months of the IPO, and zero otherwise. The regression equation is as follows:

$$\begin{aligned}\text{First-day return}_i &= a_0 + a_1\text{TopTierUnderwriter dummy}_i + a_2\ln(\text{Assets})_i \\ &+ a_3\text{Internet dummy}_i + a_4\text{Share overhang}_i + a_5\text{VC dummy}_i + a_6\text{All-star dummy}_i \\ &+ \textstyle\sum_{j=1}^{48} c_j\text{Industry dummy}_j + \sum_{t=1}^{T-1} d_t\text{Year dummy}_t + e_i,\end{aligned}$$

where Industry dummy$_j$ is the industry fixed effect for industry j, Year dummy$_t$ is the year fixed effect for year t, and e_i is the residual for IPO i.

We also include a top-tier underwriter dummy in the model specification, measuring whether the IPO had a top-tier lead underwriter (equal to one if the updated Carter-Manaster

[14] The incentive effect interpretation is that the smaller the fraction of the firm sold (and therefore the higher the overhang), the less is the incentive of the issuer to limit underpricing. The valuation effect interpretation is that if the firm is going to raise a fixed amount of money, the higher the valuation on the firm, the lower is the fraction that must be sold (and therefore the higher the overhang). A high valuation is likely to be correlated with greater uncertainty about the company's valuation, possibly resulting in greater expected underpricing.

[15] Fama-French industries are defined on the basis of four-digit SIC codes. We use the 49 industries as defined on Ken French's Web site rather than the 48 industries defined in the published article. The primary difference is that the old industry, computers, has been split into hardware and software, with some software companies that were previously grouped into business services moved into computer software.

ranking was 8 or above on a 1 to 9 scale). This measure can be used as a proxy for the various non-price dimensions that issuers care about, such as the service quality, the distribution channel, and influence within the investing community. As long as issuers care about underwriter quality, prestigious underwriters are expected to earn rents. This logic predicts a positive relation between underwriter reputation and the level of underpricing, in contrast to the negative relation predicted by certification models. Although we include the top-tier underwriter dummy here as one of the standard controls, we defer further discussion to another section when the full 1980–2008 sample is used for estimation. We do not include in our regression a price revision variable, measured as the percentage change from the midpoint of the filing range to the offer price. This variable has high predictive power, but it is very likely to be endogenous.[16]

In column 1 of Table 2-2, we present the baseline regression results without industry and year fixed effects, but using a coarser set of time controls, the bubble and post-bubble dummies. Adding the industry fixed effects in column 2 increases the R^2 by 0.9% from 26.2% to 27.1%. Using year fixed effects in column 3 instead of the period dummies increases the R^2 slightly to 27.4%. In column 3, where regression results without the all-star dummy are reported, the top-tier dummy has a coefficient of 5.58 (t=1.74), implying 5.58% more underpricing, ceteris paribus. This result is consistent with the model implication that issuers that are focused on non-price dimensions, as proxied by the top-tier underwriter dummy, are more underpriced than others, and is inconsistent with the certification hypothesis.

[16] In the later part of the 1990s and 2000, underwriters used a "walkup strategy" for some IPOs, where the file price was set low intentionally, with the expectation of an upward revision in order to create the impression of a "hot issue." Not all issuers will agree to this walkup strategy because there is a risk that the underwriters will use their bargaining power to ex-post take advantage of the issuer and set the offer price too low (i.e., hold up the issuer). This holdup risk may be of less concern for the issuers with a preference for the non-price dimensions of underwriting since they are less focused on maximizing the IPO proceeds, which suggests a positive relation between the usage of a walkup strategy and the non-price dimensions. This relation poses a problem with estimating the effect of the non-price dimensions on underpricing if the price revision is included, since part of the effect of the non-price dimension variables is captured by the price revision. We test the above implications empirically and, in unreported results, find patterns consistent with these predictions.

In column 4 of Table 2-2, we add the all-star dummy as one of the independent variables. The new addition increases the R^2 by 0.4% from 27.4% to 27.8%. The coefficient of 8.82 (t=2.56) on the all-star dummy indicates that IPOs with all-star analyst coverage from a lead underwriter are 8.82% more underpriced than those without, which is consistent with our *underpricing implication*. This significantly positive coefficient estimate is consistent with, although a bit smaller than, the coefficient reported in Cliff and Denis (2004) for 1993–2000.

When the all-star dummy is added, the coefficient on the top-tier dummy drops from 5.58 (t=1.74) to 4.21 (t=1.52), a decrease of 1.37. The smaller effect of the top-tier dummy on underpricing is due to the correlation between the top-tier dummy and the all-star dummy, as 96% of all-star analyst coverage in our sample comes from a prestigious underwriter. This suggests that when the all-star dummy is not included in the model specification, the top-tier dummy overestimates the effect of underwriter prestige on underpricing due to an omitted variable bias.[17] Since about 18% of IPOs in our sample have all-star coverage, the quantitative effect of the omitted variable bias should be $0.18\times8.82\times0.96=1.52$, which is close to the actual change of 1.37 in the top-tier coefficient.

The subperiod results are presented in columns 5 to 7 of Table 2-2. The coefficient on the all-star dummy is higher in the bubble period than in the pre- and post-bubble periods. In particular, the coefficient on the all-star dummy in 2001–2008 is small and statistically

[17] The all-star analyst dummy also suffers from an omitted variable bias. Investment banking firms generally form teams of corporate finance personnel organized on industry lines, i.e., a health care group, a technology group, a financial institutions group, etc. If the investment banking firm has an all-star analyst covering biotechnology, it will generally find it optimal to also employ high-quality personnel in health care corporate finance. Since we do not have data on the quality of these other personnel, the regression specification attributes the effect of this complementary team to the analyst, resulting in an omitted variable bias that is likely to overstate the impact of an all-star analyst on underpricing. Bradley, Choi, and Clarke (2009) report that underwriters gain market share when they hire experienced corporate finance personnel from competitors. They do not examine IPO underpricing, however.

insignificant. We take note of this pattern here and defer further discussions to subsequent sections.

The Varying Effect of Analyst Coverage on Underpricing

Our *differential analyst influence implication* suggests that the effect of all-star analyst coverage on underpricing should be greater for issuers when all-star analyst coverage has a larger effect on market value (a higher A) and should be greater in periods when all-star analyst coverage is more valuable. Based on the idea that analyst coverage is more valuable for firms with more growth options relative to assets in place, we use assets and age as proxies for the value of A, since smaller firms and younger firms among the IPO universe derive more of their value from growth options, and thus receive greater benefits from coverage by influential analysts. Moreover, since IPOs in the technology industry are difficult to value for many investors, and they frequently derive most of their value from growth options, we posit that they also tend to have a higher value of A.

In order to test how underpricing changes with the varying value of all-star analyst coverage both cross-sectionally and over time, we use industry Tobin's Q as a measure of firm growth options to proxy for the importance of all-star analyst coverage. For an IPO, its Industry-year Q is calculated as the median Tobin's Q of firms in the same Fama-French 49 industry classification in the IPO calendar year using the entire COMPUSTAT universe. Thus, if firms in some industries derive more value from growth options during some periods, the yearly Tobin's Q measure would capture the higher values of A.

We test each of these proxies for the value of analyst coverage in columns 1 to 4 of Table 2-3 separately. In column 1, we add an interaction of ln(Assets) and the all-star analyst dummy to the Table 2-2, column 4 specification. The coefficient of the interaction term is -4.55 (t=-

2.47), which has the predicted sign, suggesting that IPOs with smaller assets pay a higher price for all-star analyst coverage in terms of percentage underpricing. For instance, a small firm with \$20 million in total assets pays 30.99-4.55×ln(20)=17.4% in underpricing, while a larger firm with \$200 million in total assets pays 30.99-4.55×ln(200)=6.9% in underpricing. When age is used in column 2, a negative coefficient of -4.84 (*t*=-1.59) is observed as predicted, although it is not statistically significant at conventional levels. Similarly, when we test the interaction of a technology dummy and the all-star dummy in column 3, we observe a positive coefficient as predicted, with a point estimate of 20.17 (*t*=6.81).

In column 4, we add Industry-year *Q* and an interaction of Industry-year *Q* and the all-star dummy. The *differential analyst influence implication* suggests that the effect of all-star analyst coverage on underpricing is greater when the effect of all-star analyst coverage is larger, as we expect it to be when industry Tobin's *Q* is higher, predicting a positive coefficient on the interaction term. The coefficient on the interaction term is 10.30 (*t*=9.76), consistent with the prediction. In terms of its economic interpretation, this coefficient implies that in an industry that has changed from no growth options (a Tobin's *Q* of one) to deriving half of its value from growth options (a Tobin's *Q* of two), IPOs in the industry are expected to pay 10.30% more in underpricing when they hire an underwriter providing all-star coverage.

Including the interaction terms in regressions can introduce a multicolinearity problem. To detect the presence of this problem, we calculate variance inflation factors (VIFs) for the interaction terms and report the results in Table 2-3. A common rule of thumb is treating any VIF in excess of 10.0 as evidence of multicolinearity. While none of the VIFs reported in Table 2-3 exceed 10.0, in unreported regressions, we conduct additional robustness checks for specifications with high VIFs (greater than 5.0) by partitioning the sample into two subsamples based on the variable of interest (assets, age, and industry-year *Q*) and running a separate regression for each subsample and compare the coefficients on the all-star dummy. We find similar results using the subsample tests, suggesting that the significant results in Table 2-3 are not driven by multicolinearity.

Finally, the *differential analyst influence implication* can also help to explain the subperiod results in Table 2-2 that we noted earlier. The average Industry-year *Q* increased from 1.74 to 2.35 between 1993–1998 and 1999–2000, which suggests that the coefficient on the all-star dummy should be greater in the bubble period than in the pre-bubble period. This prediction is confirmed in Table 2-2, where the all-star dummy coefficient is 4.62 (t=2.80) in the pre-bubble period and 18.81 (t=7.11) in the bubble period, where the two coefficients are statistically different from each other at the 1% level. Moreover, the low coefficient of 0.82 (t=0.62) on the all-star dummy for the post-bubble period may be partly due to the declining value of all-star analyst coverage, as measured by a lower Tobin's *Q* of 1.79.

The low coefficient on the all-star dummy in 2001–2008 may also be partly due to the implementation of Regulation Fair Disclosure (Reg FD) in October 2000, which would not be captured by the Tobin's *Q* proxy. Reg FD requires publicly traded companies to disclose material information to all investors at the same time. This regulation limits the proprietary information analysts may acquire from a company and pass along to favored institutional clients in private telephone calls, therefore reducing the value of analysts and influence as perceived by institutional investors (Doukas, Kim, and Pantzalis, 2005). In addition, the 2003 Global Settlement that criticized analysts' biased research due to conflicts of interest may have reduced the perceived value of analyst research in the later periods.

The Effect of Varying Cost of All-star Analyst on Underpricing

In Table 2-4, we test the *coverage cost implication* that a higher cost of all-star analyst coverage is associated with higher underpricing. One way to measure the varying cost of all-star analysts is to examine capacity constraints. An analyst covers a limited number of firms. Thus, the marginal cost is higher if an analyst at full capacity is asked to cover another firm.[18] This translates into the prediction that the more firms the analyst is covering before the IPO, the higher is his or her cost of covering a particular IPO, thus demanding higher underpricing.

For each IPO covered by an all-star analyst, we use I/B/E/S to find the number of firms the analyst is covering during the one year before the IPO. The median number of firms covered is ten, which may be an underestimation since the I/B/E/S universe does not have complete analyst coverage for all firms. We interact the number of firms covered with the all-star dummy in column 1 of Table 2-4. The coefficient on the interaction term is 0.38 (t=1.19), which is positive but statistically insignificant. In column 2, we transform the number of firms covered variable into a busy dummy that equals one if the number of firms covered is greater than the median value of ten. The coefficient on the interaction between the busy dummy and the all-star dummy is 6.45 (t=1.24), again positive, but lacking statistical significance.

The Effect of IPO Frequency on Underpricing

The *deal frequency implication* states that the incremental underpricing associated with all-star analyst coverage is lower in periods when the frequency of deals in the industry is low. The reason is that when the deal frequency is low, the discount rate per period, where a period is defined as the length of time between IPOs in an industry, is large. Since the oligopolistic pricing

[18] Sell-side analysts are paid indirectly out of revenue generated from investment banking deals that they assist in attracting and soft dollars paid by institutional investors. Since institutional investors care more about large capitalization firms, foregoing coverage on one of these stocks to cover an IPO creates an opportunity cost for the analyst due to the foregone soft dollar revenue.

equilibrium is less sustainable when the discount rate per period is high, there should be less underpricing when the deal frequency in an industry is low.

To test this implication, we estimate the expected industry volume based on past industry volume. In particular, for each IPO, we calculate the number of IPOs that went public in the same Fama-French 49 industry in the previous calendar year. We run the main regression for IPOs with low lagged industry volume and high lagged industry volume separately in columns 1 and 2 of Table 2-5. When the sample of IPOs with low lagged industry volume (ten or fewer firms) is used, the coefficient on the all-star dummy is 1.74 (t=0.85). This low and insignificant coefficient on the all-star dummy contrasts with a coefficient of 14.20 (t=3.87) for IPOs with high lagged industry volume (more than ten firms).[19]

Similarly, when an interaction of the natural logarithm of lagged industry volume and the all-star dummy is added in column 3 of Table 2-5 using the entire sample of 4,510 IPOs during 1993–2008, the coefficient on the interaction term is 5.39 (t=3.79), which suggests that higher lagged industry volume is associated with a greater effect of all-star analyst coverage on underpricing, consistent with the prediction. The coefficient on the lagged industry volume is statistically insignificant, consistent with the finding in Lowry and Schwert (2002) that past IPO volume is not related to future IPO underpricing. In the column 3 regression, although the all-star dummy has a value of -4.23 (t=-1.77), when combined with an interaction coefficient of 5.39 and a value of lagged volume of ln(1+27.8)=3.36 for the mean industry, the implied effect of all-star

[19] In unreported results, industry volume based on the past two years, rather than one year, or a lower cutoff point of five instead of ten IPOs, yield similar results.

coverage in the 1993–2008 period is -4.23+5.39×3.36=13.9, or 13.9% more underpricing for an industry with average volume.[20]

In terms of time-series patterns, the average industry volume in the prior year for IPOs from 1993–1998, 1999–2000, and 2001–2008 is, respectively, 26.8, 50.3, and 8.9. The particularly low volume in the post-bubble period can partially explain the low coefficient on the all-star dummy in this period observed in column 7 of Table 2-2.

The Analyst Lust Theory of VC-backed IPOs

The *willingness to pay implication* posits that if underwriters can infer the issuer's willingness to pay, the underwriters will engage in price discrimination and leave more money on the table. In Section 2.3, the analyst lust theory of underpricing for VC-backed IPOs was described, and we test this hypothesis here. In the underpricing regressions, we use the interaction between the all-star analyst and VC dummies to measure the incremental effect of coverage from an all-star analyst for VC-backed IPOs. The model specification is:

$$\begin{aligned}&\text{First-day return}_i = a_0 + a_1\text{TopTierUnderwriter dummy}_i + \mathrm{a}_2\ln(\text{Assets})_i \\ &+a_3\text{Internet dummy}_i + a_4\text{Share overhang}_i + a_5\text{VC dummy}_i + a_6\text{All-star dummy}_i \\ &+a_7\text{VC} \times \text{All-star dummy}_i + \textstyle\sum_{j=1}^{48} \mathrm{c}_j\text{Industry dummy}_j + \sum_{t=1}^{\mathrm{T}-1} d_t\text{Year dummy}_t + e_i.\end{aligned}$$

Column 1 of Table 2-6 includes an interaction of the VC dummy and the all-star analyst coverage dummy. The coefficient on the interaction term is 18.03 (*t*=5.59), which is economically important and is consistent with the analyst lust theory of the underpricing of VC-backed IPOs. When the interaction term is added, the coefficient on the VC dummy is 2.88

[20] Since the volume for certain industries may be higher in the bubble period, there is some concern that the volume result may be driven by higher underpricing in the bubble period in general. Although we already control for year fixed effects, we address this concern further by running the Table 4 regressions without the bubble period. The regressions (unreported) yield similar qualitative results. Furthermore, we use a weighted least squares estimation where the weights are the inverse of the number of IPOs in a given year. This reduces the influence of the bubble period, and again similar results are observed.

(t=1.37). This estimate can be compared with the value of 5.89 (t=1.97) on the VC dummy in column 4 of Table 2-2, where the interaction term is not included.

With the inclusion of the VC×All-star dummy interaction, the coefficient on the VC dummy drops more than 50% from a reliably positive value of 5.89 to a statistically insignificant 2.88. Since 38.8% of IPOs are VC-backed and 7.1% of IPOs are both VC-backed and covered by an all-star analyst, the coefficient of 18.03 on the VC×All-star dummy interaction term suggests that the effect of the interaction on the VC dummy coefficient should be $18.03 \times 0.071/0.388 = 3.29$, which is close to the actual change of 3.01 in the VC dummy coefficient from 5.89 to 2.88. In both cases, the positive coefficients on the VC dummy are inconsistent with the certification theory, which predicts a negative coefficient.

At the same time, the coefficient on the all-star dummy drops from a reliably positive value of 8.82 in column 4 of Table 2-2 to a statistically insignificant 1.53 (t=0.60) in column 1 of Table 2-6. Taking the sum of the interaction term and the all-star dummy coefficients (18.03 + 1.53 = 19.56), our point estimate is that VC-backed IPOs are underpriced by 20% more when they have all-star coverage than when they do not. In other words, the evidence is that VC-backed firms are underpriced by more, but only when they receive coverage from an all-star analyst employed by a bookrunner.

As mentioned previously, the high average industry Tobin's Q during 1999–2000 suggests that all-star analyst coverage is more valuable during the bubble period. Thus, the *differential analyst influence implication* suggests that the VC×All-star interaction coefficient should be higher for the 1999–2000 subperiod than for the other subperiods. In columns 2 to 4 of Table 2-6, we report subperiod results for 1993–1998, 1999–2000, and 2001–2008. For the 1993–1998 subperiod in column 2, the coefficient on the VC×All-star interaction dummy variable is 11.58

(t=3.32). For the bubble subperiod in column 3, the coefficient on the interaction dummy is 13.98 (t=1.06), which is slightly higher than the coefficient for the pre-bubble period, but the estimate lacks statistical significance due to the high variance in underpricing during this period. In column 4, IPOs from the post-bubble period of 2001–2008 are used and both the all-star and the interaction dummies are close to zero, possibly because of the reduced importance of analyst research due to regulatory changes. Additionally, the lower point estimate for 2001–2008 is also consistent with the *deal frequency implication*, which predicts a smaller effect when deal frequency is low.

Overall, the Table 2-6 results suggest that a large portion of the effect of venture capital on underpricing comes from the VC-backed IPOs that have all-star analyst coverage provided by their IPO bookrunner. Thus, it is important to account for the effect of all-star analysts when measuring the effect of VC-backing on underpricing. If the interaction between the all-star analyst and VC dummies is missing from the regression, the estimate of the VC coefficient is overstated.

On a different note, the results in Table 2-6 suggest that non-VC-backed IPOs with all-star analysts are not more underpriced than other IPOs, since the coefficient on the all-star dummy in column 1 of Table 2-6 is not reliably different from zero. This raises two questions. First, when we control for the finding that VC-backed IPOs with all-star analysts are more underpriced, do the interaction results in Tables 2-3 and 2-5 still hold? Second, since the VC×All-star interaction results are consistent with the notion that VCs have special pricing objectives, does this also suggest that VC-backed and non-VC-backed IPOs are priced differently in other aspects? We examine these two questions next.

To address the first question, in addition to the VC×All-star interaction in the underpricing regression, we add an Industry-year $Q\times$All-star dummy interaction to test for the *differential analyst influence implication* and a Ln(1+Lagged IndVolume)×All-star dummy interaction to test for the *deal frequency implication*. We do not include other proxies of firm growth options to avoid a multicolinearity problem and we do not test the *coverage cost implication* here since it yielded insignificant results when previously tested. The regression results are reported in column 5 of Table 2-6. The main variables of interest are the three interaction terms, where the VC×All-star dummy interaction has a coefficient of 11.17 (t=2.61), the Industry-year $Q\times$All-star dummy interaction has a coefficient of 6.07 (t=3.99), and the Ln(1+Lagged IndVolume)× All-star dummy interaction has a coefficient of 2.82 (t=3.93). All three interaction terms are positive and significant, which suggests that controlling for the presence of VC-backed IPOs with all-star analysts does not subsume the findings of earlier tests.

In order to address the second question of how VC-backed and non-VC-backed IPOs are priced differently in the context of our theory, we proceed in two steps. In step one, we focus on the all-star analyst dimension and test how underpricing varies along its different aspects for IPOs with and without VC-backing. In step two, we focus on the other non-price dimensions and test how their effects on underpricing differ for VC-backed and non-VC-backed IPOs. We undertake step one here and defer the analysis of the second step to Section 6 when the other non-price dimensions are examined.

In Table 2-7, we test each of the model implications for the all-star analyst dimension on VC-backed and non-VC-backed IPOs separately. The VC-backed IPO sample consists of 1,751 IPOs, or 38.8% of the 4,510 IPOs. 321 (18.3%) of the 1,751 VC-backed IPOs and 505 (18.3%) of the 2,759 non-VC-backed IPOs are covered by an all-star analyst from the lead underwriter.

First, we note that most of the interaction term coefficients in Panels A to G of Table 2-7 are significant in the VC-sample, while they are mostly not significant in the non-VC sample. Second, the magnitudes of the interaction term coefficients suggest that the effect of all-star analyst coverage on underpricing is more sensitive in the VC sample than in the non-VC sample to proxies for the importance of all-star coverage, the cost of analyst coverage, and IPO frequency, although the differences are not always statistically significant. For instance, the coefficient on the Ln(Assets)×All-star dummy interaction in Panel A is -12.12 (*t*=-10.18) in the VC sample, which is seven times the coefficient of -1.62 (*t*=-0.91) in the non-VC sample. The interaction terms in the other panels also exhibit similar patterns, with the exception of Panel D, where the coefficient on the Industry-year Q×All-star dummy interaction is higher in the non-VC sample (although it is less significant).

Overall, the results in Table 2-7 highlight the importance of the all-star analyst dimension to VC-backed IPOs. The empirical evidence is consistent with our hypothesis that VCs are more focused on the intermediate-term value of the firm over which influential analysts can exert more influence. Their special objective suggests that VCs have a higher willingness to pay for all-star analysts using underpricing and are more sensitive to different aspects of the all-star analyst dimension.

Costs and Benefits of All-star Analyst Coverage to Issuers

We can calculate the incremental money left on the table due to all-star analyst coverage as $(OP_{nostar} - OP_{star}) \cdot N_{issued}$, where OP_{nostar} is the offer price in the absence of all-star analyst coverage, OP_{star} is the offer price with all-star analyst coverage, and N_{issued} is the number of shares issued in the IPO. We can estimate the offer price without all-star analyst coverage as $OP_{nostar} = P_1/(P_1/OP_{star} - 0.0882)$, where P_1 is the first-day closing price, OP_{star} is the offer price observed, and 0.0882 is the coefficient on all-star coverage from the regression in column 4 of Table 2-2, expressed as a decimal rather than a percentage. The money left on the table due to all-star analyst coverage is then estimated to be $17.5 billion in total for the 826 firms with an all-star analyst, or an average of $21 million per firm.

The benefits of all-star analyst coverage to issuers are more difficult to quantify since some benefits are indirect. As a start, in untabulated results, we estimate the announcement returns to analyst recommendation initiations, reiterations, upgrades, and downgrades. All-star analysts tend to have greater announcement effects than non-all-star analysts across different recommendation types. The most notable difference is for an upgrade to strong buy, where we observe a 1.92% (t=2.66) larger announcement effect in spite of the fact that all-star analysts tend to cover larger firms.[21] Using the IPO first-day closing price to estimate its market value, a 1.92% increase in the mean market value of $1.52 billion for the 826 firms translates into a $29 million increase in market value per firm. Even without accounting for other benefits of all-star analyst coverage such as more publicity and a potentially larger institutional investor following, a strong buy recommendation upgrade alone is enough to counter the cost of $21 million in terms of money left on the table. At the very least, this suggests that it is rational for issuers to perceive coverage from an all-star analyst as important and that it is worthwhile to pay for this coverage through higher IPO underpricing. Finally, some issuers may receive greater benefits from analyst coverage than others. For example, Aggarwal, Krigman, and Womack (2002) find that research

[21] Using I/B/E/S data for our 1993–2008 IPOs, we calculate the abnormal three-day announcement returns for recommendations in the two years after the IPO day as the compounded three-day stock return from the event day 0 to day 2 minus the compounded market return (using the CRSP value-weighted index) for the same three days. We account for confounding news effects by deleting all recommendations where multiple recommendations are announced on the same day. The abnormal three-day announcement returns for analyst recommendations (initiation, reiteration, upgrade, and downgrade) are estimated to be 0.61%, 0.29%, 4.24%, and -0.74% for all-stars and 0.43%, -0.05%, 3.24%, and -0.54% for non-all-stars. When we examine strong buy recommendation upgrades, the abnormal three-day announcement returns for recommendations by all-stars and non-all-stars are, respectively, 5.29% and 3.37%, with a difference of 1.92% (t=2.66).

coverage is positively correlated with insider selling at the lockup expiration and Martin (2010) finds that IPOs backed by venture capitalists are more likely to receive optimistic recommendations during the lockup period.

Robustness Checks

Alternative explanations

An alternative explanation for the effect of all-star analyst coverage on underpricing is that the incremental underpricing is not due to underwriters having market power, but instead is used to cover the higher costs of all-star analyst coverage. Under this alternative story, higher underpricing for IPOs with all-star coverage can arise in a market of perfect competition, without any underwriters having market power. There are several reasons, however, to doubt this story as a complete explanation.

First, the incremental money left on the table due to all-star analyst coverage is large compared to the costs of providing research coverage. Although there may be costs of providing analyst coverage other than the salary and bonus paid, an average of $21 million per IPO seems far too large to be attributed to the costs alone, given that a typical all-star analyst is covering ten or more stocks. Second, our model implications and empirical results show that the effect of all-star analyst coverage on underpricing varies with IPO industry volume and the importance of all-star analyst coverage. It is difficult to account for the magnitude of these patterns with the cost story. Third, we show that issuers with a higher willingness to pay for all-star analyst coverage have even more underpricing. Although it is possible for the costs of all-star analyst coverage to vary across firms, differential costs alone are hard to reconcile with the magnitude of the incremental underpricing difference between issuers with varying degrees of willingness to pay.

While administrative and employment costs alone are unlikely to account for the observed patterns, there is still a concern that reputation costs can be large. Specifically, asking all-star analysts to cover and promote stocks that they otherwise would not cover may harm their reputation and result in the loss of all-star status. Since all-star analysts are valuable to underwriters in attracting investment banking business, losing all-star status can lead to millions in foregone revenue, which needs to be compensated ex-ante with higher underpricing. While this story is sensible, it makes a critical assumption that coverage of IPOs underwritten by the lead underwriter results in the loss of all-star status. To test this hypothesis directly, we examine the effect of IPO coverage on all-star status empirically in unreported regressions. We find that an all-star analyst covering an IPO underwritten by its lead underwriter in year t-1 has a positive effect on the analyst being an all-star in year t. However, we do not find that covering an IPO with high underpricing, covering an IPO backed by venture capital, or covering a VC-backed IPO with high underpricing in year t-1 has any significant effect on all-star status in year t. Thus, the empirical evidence is not consistent with the reputation cost story.

Another alternative story is that all-star analysts are being bullish on some potential IPO firms and have convinced their investment banks to underwrite these IPOs. If the all-star analysts are right that these IPOs do have higher first-day returns, then a positive correlation between all-star analyst coverage and IPO underpricing would be observed. The key underlying assumption in this story is that all-star analysts have superior forecasting ability and they have the ability to spot winners among IPO firms for which there is little information available. However, there is a lack of consistent evidence supporting this assumption. For instance, according to surveys of institutional investors in *Institutional Investor* magazine, all-star analysts are valued for their industry knowledge, not for their stock-picking abilities. Moreover, this story suggests that all-star analyst coverage proxies for some unobservable part of underpricing, or that all-star analyst coverage is an endogenous variable. We address this issue in the next section.

Control for endogeneity

In our regression specifications, we have taken the explanatory variables as exogenous. Although top-tier underwriter status can be considered endogenous, in unreported regressions, when we control for endogeneity with an instrumental variable regression as in Table 6 of Loughran and Ritter (2004), our conclusions do not qualitatively change. It is also possible that all-star analyst coverage is an endogenous variable, with a company that would have high underpricing for unspecified exogenous reasons being more attractive for an underwriter with an all-star analyst in the issuer's industry. If this story is correct, then underpricing causes all-star analyst coverage, rather than all-star analyst coverage causing underpricing.

To account for the possibility that all-star coverage may be endogenous, we use a two-stage estimation procedure similar to those used in Lowry and Shu (2002) and Cliff and Denis (2004).[22] In unreported regressions, a coefficient of 9.50 (t=3.43) on the all-star instrument is observed. This coefficient estimate is virtually identical to the estimate of 8.82 (t=2.56) reported in Table 2-2, suggesting that our results are not driven by endogeneity.

Other Non-price Dimensions

In the last section, we focused on the all-star analyst dimension and in this section, we focus on the other non-price dimensions. One of the non-price dimensions tested is industry expertise. Another test focuses on an issuer-specific HHI measure, which is used to proxy for some non-price dimensions that are not explicitly measured. Additionally, the underwriter quality dimension is tested on the full sample of IPOs from 1980–2008 and discussed in more detail. Finally, we assess the economic significance of our regression results.

[22] Cliff and Denis (2004) report instrumental variable regressions with an instrument for analyst coverage on I/B/E/S, but not for all-star analyst coverage.

Industry Expertise

The main model implication is that if issuers care about a non-price dimension, they are expected to pay for it with more underpricing. Or phrased differently, IPOs using an underwriter that is strong in a non-price dimension are more underpriced than those IPOs using an underwriter that is weak. We test this implication for the non-price dimension of industry expertise in Table 2-8 using three different measures of industry expertise.

Our first industry expertise proxy, Industry experience, is the natural logarithm of one plus the number of IPOs in the same industry a given lead underwriter has underwritten in the five years prior to an IPO.[23] The proxy is motivated by how underwriters pitch to prospective issuers. In order to win a particular IPO mandate, underwriters need to show that they understand the firm's business and can successfully market the firm to institutional investors. A way to demonstrate such industry expertise is to provide a record of similar firms that the underwriter has taken public in the past. In our test, we define similar IPOs as those in the same Fama-French (1997) 49 industry.

In order to use the full sample from 1980–2008 in Table 2-8, we set the all-star dummy to zero for IPOs prior to 1993 when analyst information became available, with the year fixed effects for these years incorporating the effects of the missing information. In addition to the usual controls, we include a control for the number of IPOs in the same Fama-French 49 industry that went public in the five years before a given IPO. Since we are interested in the number of IPOs underwritten by the lead underwriter, including ln(1+Number of industry IPOs) ensures that our lead underwriter experience measure is not merely picking up general industry activity. In column 1 of Table 2-8, we use Industry experience. A coefficient of 1.77 (t=3.50) on this industry expertise measure is consistent with the model prediction that issuers pay for non-price

[23] For IPOs from 1980 to 1984, data on IPOs from 1975 to1979 are also used in the calculations.

dimensions of IPO underwriting by leaving more money on the table. Economically, the coefficient of 1.77 suggests that an underwriter with extensive experience in an issuer's industry (e.g., having underwritten ten IPOs in the past five years in the same industry), charges 4.2% ($1.77 \times \ln(1+10)$) more in underpricing than an underwriter with no experience.

In column 2 of Table 2-8, we use a high industry experience dummy, which equals one if the lead underwriter has underwritten more than five IPOs in the same industry in the prior five calendar years and zero otherwise. This dummy variable has a coefficient of 5.68 (t=9.56), indicating that high industry expertise is paid for with 5.68% more underpricing, on average. Lastly, in column 3, we construct a top-5 dummy that equals one (zero otherwise) for the top five underwriters in an industry based on IPO volume in the past five years. This measure has the advantage that it is not sensitive to volume differences across industries and thus, is also used in Table 2-9. The effect of this variable on underpricing is 3.47 (t=3.60). Overall, using three different proxies for industry expertise, we confirm the model prediction that issuers choosing an underwriter with more expertise in their industry have higher underpricing.

Issuer-specific HHI

The *underwriter concentration implication* suggests a relation between industry HHI and industry average underpricing. The rationale is that under certain conditions, as the value of non-price dimensions increases, both the market share of the dominant underwriters and the average industry underpricing increase. This relation provides a way for us to estimate the effect of non-price dimensions that are not explicitly measured.

The idea is to estimate an HHI for the underwriting market that each issuer is likely to face. For each IPO i, we find a set of underwriters that fits three criteria. First, the underwriter has underwritten one IPO or more in the same Fama-French 49 industry during the five calendar years prior to IPO i. Second, the underwriter has the same top-tier status as IPO i's lead underwriter. Third, the underwriter has underwritten IPOs in a similar size range as IPO i. The size range for each underwriter is estimated based on the minimum and maximum inflation-adjusted proceeds of IPOs that the underwriter has underwritten over the entire sample period of 1980–2008.[24] Thus, the underwriters that fit these criteria are compatible with IPO i in terms of industry, top-tier status, and size specialization. For these underwriters, we calculate their market share within the set of IPOs they have underwritten during the five years prior to IPO i that are in the same industry. Finally, issuer-specific HHI is calculated as the sum of the squares of the underwriters' market share. Intuitively, issuer-specific HHI approximates the market concentration of an underwriting market faced by a particular issuer.

At one extreme, if all underwriters are similar, then they should have similar market shares, and thus a lower HHI. At the other extreme, if some underwriters have market power on account of their non-price dimensions, then the resulting oligopoly will show up in a higher HHI. Hence, we expect a positive relation between the issuer-specific HHI and IPO underpricing. In Table 2-9, we test this prediction in column 1 where the full sample of 7,319 IPOs from 1980–2008 is used. The coefficient on the issuer-specific HHI variable is 5.05 (t=2.81), confirming our prediction. The point estimate suggests that, on average, issuers facing a market with one dominant player (HHI close to one) pay 5% more in underpricing than those facing a dispersed market (HHI close to zero). The fact that the coefficients on the other non-price dimension variables barely change when the issuer-specific HHI is added suggests that the issuer-specific HHI captures some additional non-price dimensions beyond those that are already measured.

[24] For example, since the smallest IPO that Goldman Sachs underwrote was for $14.05 million (in $ of 2003 purchasing power) in proceeds, Goldman would not be considered a candidate underwriter for the 1,461 IPOs in our sample during 1980–2008 that were smaller than this.

Top-tier Underwriters

We have already tested and found a positive relation between the underwriter's top-tier status and IPO underpricing for a subsample of IPOs from 1993–2008 in Tables 2-2 to 2-6. In Table 2-9, we include the earlier years and conduct the tests on a sample of IPOs from 1980–2008.

For the full sample results in column 1 of Table 2-9, the top-tier dummy has a coefficient of 2.40 (t=1.25), implying 2.40% more underpricing. The subperiod results are interesting in that the coefficient on the top-tier dummy is -2.48 (t=-3.46) in 1980–1989, while the post-1989 subperiod coefficients are all positive. This change in sign of the top-tier underwriter coefficient has been documented by other studies, but the reason for the change is not clear.

The certification theory of IPO underpricing predicts a negative coefficient as observed in the 1980s, while our local oligopolies theory of IPO underpricing predicts a positive coefficient as observed in later subperiods. These conflicting predictions can be reconciled when their underlying assumptions are examined. The certification theory is based on the premise that issuers want to minimize IPO underpricing and underpricing is necessary to compensate investors for the risks of investing. Due to reputation concerns, prestigious underwriters aid in certifying IPO value and help issuers to raise more IPO proceeds, and thus are associated with lower underpricing.

In Section 4, we observed that competition between underwriters on the basis of gross spreads fell dramatically during the 1980s and 1990s. If underwriters compete on the gross spread, it suggests that the gross spread is an important decision criterion for issuers in choosing an underwriter. It also means that issuers are more price sensitive, so they care more about how cheaply they can raise money in an IPO. In terms of the subperiods, it suggests that issuers are more price sensitive and underwriters competed more on fees in the 1980s than in later periods.

Thus, the certification theory is more applicable in the 1980s and the negative coefficient on the top-tier underwriter dummy for the 1980s is consistent with this interpretation. In the later subperiods, however, we posit that underwriters compete less on gross spread and more on non-price dimensions. This suggests that issuers are willing to pay for these services, which corresponds to a positive coefficient on the top-tier underwriter dummy.

The subperiod results in columns 2 to 6 of Table 2-9 suggest that the effect of the non-price dimensions on IPO underpricing is much smaller in the 1980s than in the 1990s and the bubble period. This is consistent with the notion that the non-price dimensions are less important in the 1980s than later on. In addition, the generally smaller coefficients on the non-price dimensions in the post-bubble period may be partly due to the low volume of IPOs in this period, consistent with the *deal frequency implication*.

Finally, if oligopolistic underwriters are able to win mandates in spite of greater expected underpricing, we would expect all of our empirical results to hold if we measure underpricing using the midpoint of the original file price range rather than the actual offer price. In untabulated results, we confirm this prediction. Indeed, the results tend to be even stronger, suggesting that the oligopolistic underwriters intentionally low-ball the filing price range. These results corroborate the findings in Lowry and Schwert (2004) that the midpoint of the filing range is not an unbiased predictor of the offer price.

Non-Price Dimensions and VC-backing

In Section 5.6, we found that the all-star analyst dimension is more important for IPOs backed by venture capitalists. In Table 2-10, we examine whether the effects of other non-price dimensions on underpricing differ for VC-backed and non-VC-backed IPOs. First, we confirm the earlier finding that the all-star analyst dimension is more important for VC-backed IPOs. Similar to the all-star analyst result, we find that the effect of the top-tier dummy on underpricing is positive and marginally significant in the VC sample, but is not significantly different from zero in the non-VC sample, although the point estimates of 2.92 and 2.17 do not differ much.

As for the other two non-price dimension variables, we find that the coefficients on the top-5 dummy and the issuer-specific HHI are both economically and statistically significant for the VC and non-VC samples. The point estimates indicate that the effect of these two variables on underpricing is higher in the VC sample. Overall, the Table 2-10 results show that all four non-price dimensions are relevant for VC-backed IPOs, while only the industry expertise and underwriter concentration dimensions are relevant for non-VC-backed IPOs. These findings suggest that VC-backed and non-VC-backed IPOs are competed for along different non-price dimensions, further highlighting the special pricing objectives of the venture capitalists.

The Economic Significance of the Non-price Dimensions

How important are the non-price dimensions economically? To answer this question, we calculate the economic effect of the non-price dimensions by multiplying their coefficient estimates in the underpricing regressions with their sample means. For example, if 18% of the IPOs have coverage from an all-star analyst and these IPOs are 8.82% more underpriced on average, then the total effect of the all-star analyst dimension on underpricing is 0.18×8.82 or 1.6%.

Given the coefficient estimates in column 1 of Table 2-9 for the top-tier dummy, the all-star dummy, the top-5 industry expertise dummy, and the issuer-specific HHI, and the sample means for the 1980–2008 period, we estimate that the total effect of these four non-price dimensions on underpricing is $2.40 \times 0.61 + 9.58 \times 0.11 + 3.50 \times 0.23 + 5.05 \times 0.19 = 4.3\%$. To assess how large this effect is, we compare it to the average underpricing during this period, which is 18.2%. Thus, the effect of the non-price dimensions on underpricing accounts for 24%

(4.3%/18.2%) of the average underpricing in 1980–2008. Note that this number is probably underestimated since the all-star dummy is only available for part of the period.

Similarly, based on the regression results in column 2 of Table 2-9 for the 1993–2008 period, we estimate that the effect of the non-price dimensions on underpricing is $4.72 \times 0.68 + 8.27 \times 0.18 + 4.81 \times 0.23 + 14.82 \times 0.16 = 8.2\%$. Since the average underpricing is 24.4% in 1993–2008, the effect of the non-price dimensions on underpricing accounts for 34% (8.2%/24.4%) of the average underpricing.

More interestingly, we estimate the effect of the non-price dimensions on underpricing during the bubble period when the underpricing is particularly high. Using the estimates in column 5 of Table 2-9 and the variable sample means during 1999–2000, we estimate that the effect of the non-price dimensions on underpricing is $14.68 \times 0.82 + 17.50 \times 0.26 + 7.45 \times 0.25 + 43.45 \times 0.10 = 22.8\%$. Given that the average underpricing during the bubble period is 64.5%, the effect of the non-price dimensions on underpricing accounts for 35% (22.8%/64.5%) of the average underpricing.

Taken together, the numbers suggest that the effect of the four non-price dimensions on underpricing is economically important as their total effect accounts for about 30% of the average underpricing.

Summary

Most theories of IPO underpricing are based on information asymmetry and agency explanations. We depart from previous approaches by drawing analogies between an IPO underwriting market and a typical product market. In this way, we develop a theory of the underpricing of IPOs based on differentiated underwriting services and localized competition.

Despite a large number of investment banking firms competing for IPOs, we posit that the IPO underwriting industry is best characterized as a series of local oligopolies due to the preference of issuers for non-price dimensions that are bundled with underwriting. Consequently, a limited number of underwriters that can provide these non-price dimensions will acquire some market power and earn rents on the IPOs of firms in any given industry. Moreover, the rent varies with the value and the cost of the non-price dimensions, the deal frequency, and the issuer's willingness to pay for the differentiated services.

Empirically, we find evidence consistent with our model predictions. In particular, we find that IPOs are more underpriced when they have coverage from an all-star analyst, when their underwriters have better quality or more industry expertise, and when they face a more concentrated underwriting market.

We also propose and test the analyst lust theory of VC-backed IPOs. By looking at the interaction of the presence of VC-backing and coverage by an all-star analyst employed by the bookrunner, we identify a previously undocumented pattern: VC-backed IPOs that are covered by an all-star analyst are underpriced by 20% more than VC-backed IPOs with no all-star analyst coverage. When this interaction term is included, the effect of VC backing by itself is substantially reduced, suggesting that most of the effect of VC-backing on underpricing is due to the greater focus by venture capitalists on all-star analyst coverage. Moreover, consistent with VCs having special pricing objectives, we find that VC-backed IPOs are also more sensitive to different aspects of the all-star analyst dimension than non-VC-backed IPOs.

Finally, our theory can also be used to explain existing empirical findings and generate new predictions in non-IPO areas. For instance, Kang and Liu (2007) find that the offer prices of corporate bonds are lower if there is a close prior lending relationship between banks and their client issuers. This bond underpricing can be interpreted as indicating that a non-price dimension that issuers care about is commercial bank loans that are tied-in with bond underwriting, and from which investment banks earn rents. Also, consistent with our theory, Mola and Loughran (2004) report that the hiring of an underwriter with a high number of all-star analysts is associated with greater underpricing of seasoned equity offerings. Their subperiod results are also consistent with our time-series prediction that the effect of analyst coverage on underpricing is higher in periods during which analyst coverage is more important.

Table 2-1. Variable Definitions

Variable	Definition	Source	Full sample Mean [SD]	Subsample Mean [SD]
First-day return	Percentage change from the offer price to the first-day closing price	Thomson Financial's new issues database with corrections	18.2% [39.9%]	24.4% [48.3%]
Proceeds	The offer price times the number of global shares offered, excluding overallotment options, expressed in millions of dollars	Thomson Financial's new issues database with corrections	$96.0m [$341.4m]	$123.7m [$421.6m]
Top-tier dummy	Equals one (zero otherwise) if the lead underwriter has an updated Carter and Manaster (1990) rank of 8 or more	Jay Ritter's Web site	61.4%	68.0%
Assets	Firm's pre-issue book value of assets, expressed in millions of dollars	Thomson Financial's new issues database with corrections	$590.2m [$6,723.8m]	$790.1m [$8,265.5m]
Internet dummy	Equals one (zero otherwise) if the firm is in the Internet business defined in Appendix D of Loughran and Ritter (2004)	Jay Ritter's Web site	7.5%	12.1%
Tech dummy	Equals one (zero otherwise) if the firm is in the technology or Internet business defined in Appendix D of Loughran and Ritter (2004)	Thomson Financial's new issues database with corrections	36.5%	41.7%
Age	Calendar year of offering minus the calendar year of founding (defined in Field and Karpoff, 2002; and Appendix A of Loughran and Ritter, 2004)	Jay Ritter's Web site	8 years (median)	7 years (median)
Share overhang	Ratio of retained shares to the public float	Thomson Financial's new issues database with corrections	2.9 [2.0]	3.0 [2.1]
VC dummy	Equals one (zero otherwise) if the IPO was backed by venture capital	Thomson Financial's new issues database with corrections from Paul Gompers, Josh Lerner, Jerry Cao, and the authors	34.9%	38.8%
Bubble dummy	Equals one (zero otherwise) if the IPO occurred during 1999–2000		11.7%	18.9%
Post-bubble dummy	Equals one (zero otherwise) if the IPO occurred during 2001–2008		11.8%	19.1%

The full sample consists of 7,319 operating firm IPOs from 1980–2008 and the subsample consists of 4,510 operating firms IPOs from 1993–2008 going public in the U.S. for which the offer price is at least $5.00 and complete data on all of the variables are available. IPOs using auctions, unit offers, ADRs, banks and S&Ls, and IPOs not listed on CRSP within six months of issuing are excluded. Relevant variable means and standard deviations [in brackets] for the full sample and the subsample are reported. All dollar values are in dollars of 2003 purchasing power using the Consumer Price Index.

Table 2-1. Continued.

Variable	Definition	Source	Full sample Mean [SD]	Subsample Mean [SD]
All-star dummy	Equals one (zero otherwise) if the IPO is covered by an *Institutional Investor* all-star analyst (top 3) from the bookrunner within one year of the IPO. IPOs in year *t* are deemed to be covered by an all-star from October of year *t*-1 if this analyst initiates coverage within 12 months of the IPO	I/B/E/S, Investext, and other sources; Lily Fang, Dan Bradley, and Jonathan Clarke; *Institutional Investor*'s annual October issue for 1992–2007	11.3%	18.3%
VC×All-star dummy	An interaction of the VC dummy with the All-star dummy		-	7.1%
Industry-year *Q*	The median Tobin's *Q* of firms in the same Fama-French 49 industry in the IPO year using the entire Compustat universe, with *Q* defined as (assets-book equity+MV of equity)/assets, where MV of equity is the number of shares outstanding times the market price at the end of the fiscal year	Compustat	-	1.9 [0.8]
Number of firms covered	The number of firms covered by the all-star analyst during the one year prior to the IPO (mean is based on the sample of IPOs with an all-star analyst)	I/B/E/S	-	11.7 [6.4]
Busy dummy	Equals one (zero otherwise) if the number of firms covered by an all-star analyst is greater than ten (the median)	I/B/E/S	-	6.2%
Lagged industry volume	The number of IPOs of the same industry that went public in the previous calendar year before an IPO, using the (revised) 49 industries in Fama and French (1997)	Thomson Financial's new issues database with corrections;	-	27.8 [33.7]
Number of industry IPOs	The number of IPOs of the same Fama-French 49 industry that went public in the five years before an IPO	Thomson Financial's new issues database with corrections	82.4 [99.2]	112.6 [114.4]
Industry experience	The number of IPOs of the same Fama-French 49 industry underwritten by the lead underwriter in the five years before an IPO	Thomson Financial's new issues database with corrections;	2.0 [5.5]	2.6 [6.8]
High industry experience dummy	Equals one (zero otherwise) if a lead underwriter has underwritten more than five IPOs in the same Fama-French 49 industry in the five years before the IPO	Thomson Financial's new issues database with corrections	9.8%	13.8%
Top-5 dummy	Equals one (zero otherwise) if a lead underwriter is one of the five top underwriters in the given Fama-French 49 industry based on the number of IPOs underwritten in the five years before the IPO	Thomson Financial's new issues database with corrections	22.7%	22.6%
Issuer-specific HHI	The sum of the squares of the market shares of underwriters that are matched with the issuer on the basis of top-tier status, size, and industry	Thomson Financial's new issues database with corrections	0.19 [0.19]	0.16 [0.16]

Table 2-2. IPO Underpricing Regressions with an All-star Analyst Coverage Dummy

	(1) All IPOs	(2) All IPOs	(3) All IPOs	(4) All IPOs	(5) 1993–1998	(6) 1999–2000	(7) 2001–2008
Top-tier dummy	5.90	5.84	5.58	4.21	2.89	13.03	4.03
	(1.70)	(1.83)	(1.74)	(1.52)	(1.20)	(0.83)	(2.78)
Ln(Assets)	-2.38	-2.33	-2.38	-2.70	-2.12	-4.57	-0.98
	(-3.14)	(-4.14)	(-3.75)	(-3.59)	(-5.71)	(-2.81)	(-1.60)
Internet dummy	28.41	26.01	24.65	24.31	29.37	23.81	0.85
	(5.67)	(5.09)	(4.76)	(4.91)	(1.76)	(3.54)	(0.30)
Share overhang	5.05	4.92	5.06	4.94	2.44	8.81	2.02
	(3.35)	(3.34)	(3.23)	(3.38)	(5.79)	(3.55)	(3.77)
VC dummy	5.00	5.65	5.79	5.89	0.43	24.69	5.49
	(1.46)	(1.92)	(1.89)	(1.97)	(0.30)	(3.03)	(3.88)
All-star dummy	-	-	-	8.82	4.62	18.81	0.82
				(2.56)	(2.80)	(7.11)	(0.62)
Bubble dummy	23.83	24.03	-	-	-	-	-
	(4.66)	(4.28)					
Post-bubble dummy	-5.06	-2.95	-	-	-	-	-
	(-2.58)	(-1.87)					
Year fixed effects	No	No	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	No	Yes	Yes	Yes	Yes	Yes	Yes
N	4,510	4,510	4,510	4,510	2,796	853	861
R^2_{adj}	26.2%	27.1%	27.4%	27.8%	14.4%	21.2%	13.1%

The sample in columns 1 to 4 includes 4,510 U.S. operating firm IPOs from 1993–2008 with an offer price of at least $5 and meeting other criteria. The subperiod samples in columns 5 to 7 have average first-day returns of 15.9%, 64.5%, and 12.1%, respectively, with an average over the entire sample of 24.4%. The dependent variable in all regressions is the percentage return from the offer price to the first-day closing price. The Top-tier dummy equals one (zero otherwise) if the lead underwriter has an updated Carter and Manaster (1990) rank of 8 or more. Ln(Assets) is the natural logarithm of the firm's pre-issue book value of assets in millions of dollars. The Internet dummy equals one (zero otherwise) if the firm is in the Internet business. Share overhang is the ratio of retained shares to the public float (the number of shares issued). The VC dummy equals one (zero otherwise) if the IPO was backed by venture capital. The All-star analyst dummy takes a value of one if one or more of the bookrunners had an *Institutional Investor* all-star analyst (top 3) cover the stock within 12 months of the IPO. The Bubble dummy takes on a value of one (zero otherwise) if the IPO occurred during 1999–2000, and the Post-bubble dummy takes on a value of one (zero otherwise) if the IPO occurred during 2001–2008. Year fixed effects based on the IPO year and industry fixed effects based on the 49 Fama-French industries are included, where the coefficients are not reported for brevity. The *t*-statistics (in parentheses) are computed using heteroskedasticity-consistent standard errors that are corrected for clustering across year and industry.

Table 2-3. IPO Underpricing Regressions with All-star Analyst Dummy and Interactions

	(1)	(2)	(3)	(4)
Top-tier dummy	2.96	4.10	4.76	4.20
	(1.21)	(1.49)	(1.62)	(1.56)
Ln(Assets)	-1.61	-2.41	-2.68	-2.51
	(-3.70)	(-4.01)	(-3.42)	(-3.80)
Internet dummy	24.19	23.61	26.52	23.78
	(4.88)	(4.98)	(4.38)	(5.72)
Share overhang	4.82	4.82	4.72	4.86
	(3.44)	(3.45)	(3.30)	(3.39)
VC dummy	5.60	5.48	5.66	5.95
	(1.95)	(1.93)	(1.89)	(1.92)
All-star dummy	30.99	20.07	0.26	-10.55
	(2.70)	(2.03)	(0.24)	(-5.81)
Ln(1+Age)	-	-0.25	-	-
		(-0.38)		
Tech dummy	-	-	-10.56	-
			(-1.74)	
Industry-year *Q*	-	-	-	10.24
				(3.61)
Ln(Assets)×All-star dummy	-4.55	-	-	-
	(-2.47)			
Ln(1+Age)×All-star dummy	-	-4.84	-	-
		(-1.59)		
Tech dummy×All-star dummy	-	-	20.17	-
			(6.81)	
Industry-year *Q*×All-star dummy	-	-	-	10.30
				(9.76)
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Interaction term VIF	9.37	6.43	2.06	6.61
N	4,510	4,510	4,510	4,510
R^2_{adj}	28.2%	28.0%	28.5%	28.9%

The sample includes 4,510 U.S. operating firm IPOs from 1993–2008. The dependent variable in all regressions is the percentage first-day return. Age is the difference between the IPO year and the founding year. The Tech dummy equals one (zero otherwise) if the firm is in the technology or Internet business. Industry-year *Q* is the median Tobin's *Q* of firms in the same industry in the IPO year using the entire Compustat universe. The other explanatory variables are defined in Table 2-1. Year fixed effects based on the IPO year and industry fixed effects based on the 49 Fama-French industries are included, where the coefficients are not reported for brevity. Interaction term VIF reports the variance inflation factor for the interaction term in the corresponding regression. The *t*-statistics (in parentheses) are computed using heteroskedasticity-consistent standard errors that are corrected for clustering across year and industry.

Table 2-4. IPO Underpricing Regressions with Proxies for the Cost of All-star Analyst Coverage

	(1)	(2)
Top-tier dummy	4.14	4.15
	(1.51)	(1.51)
Ln(Assets)	-2.70	-2.70
	(-3.57)	(-3.58)
Internet dummy	24.28	24.30
	(4.89)	(4.88)
Share overhang	4.94	4.93
	(3.38)	(3.39)
VC dummy	5.92	5.89
	(1.97)	(1.96)
All-star dummy	5.89	6.63
	(2.60)	(2.62)
Number of firms covered × All-star dummy	0.38	-
	(1.19)	
Busy dummy × All-star dummy	-	6.45
		(1.24)
Year fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
Interaction term VIF	2.00	1.47
N	4,510	4,510
R^2_{adj}	27.8%	27.8%

The sample includes 4,510 U.S. IPOs from 1993–2008. The dependent variable in all OLS regressions is the percentage first-day return. Number of firms covered is the number of firms covered by the all-star analyst during the one year prior to the IPO. Busy dummy equals one (zero otherwise) if the number of firms covered is greater than ten. The other explanatory variables are defined in Table 2-1. Year fixed effects based on the IPO year and industry fixed effects based on the 49 Fama-French industries are included, where the coefficients are not reported for brevity. Interaction term VIF reports the variance inflation factor for the interaction term in the corresponding regression. The *t*-statistics (in parentheses) are computed using heteroskedasticity-consistent standard errors that are corrected for clustering across year and industry.

Table 2-5. IPO Underpricing Regressions with Industry Volume and All-star Analyst Variables

	(1) Volume≤10	(2) Volume>10	(3) All IPOs
Top-tier dummy	2.31	4.81	4.43
	(1.24)	(1.48)	(1.56)
Ln(Assets)	-2.04	-3.11	-2.66
	(-3.54)	(-3.38)	(-3.76)
Internet dummy	25.13	21.73	24.08
	(1.83)	(6.56)	(4.79)
Share overhang	3.95	5.27	4.77
	(3.48)	(3.46)	(3.43)
VC dummy	2.26	7.21	5.63
	(1.66)	(1.78)	(1.95)
All-star dummy	1.74	14.20	-4.23
	(0.85)	(3.87)	(-1.77)
Ln(1+Lagged IndVolume)	-	-	-1.16
			(-0.88)
Ln(1+Lagged IndVolume)×All-star dummy	-	-	5.39
			(3.79)
Year fixed effects	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
Interaction term VIF	-	-	4.11
N	1,645	2,865	4,510
R^2_{adj}	21.3%	28.6%	28.1%

The sample in column 1 includes 1,645 U.S. IPOs for which ten or fewer firms in its corresponding Fama-French (1997) 49 industry went public in the previous year. The sample in column 2 includes 2,865 U.S. IPOs for which more than ten firms of its industry went public in the previous year. The sample in column 3 includes 4,510 U.S. operating firm IPOs in 1993–2008. The dependent variable in all OLS regressions is the percentage first-day return. Ln(1+Lagged IndVolume) is the natural logarithm of the number of IPOs in the same industry that went public in the previous calendar year before an IPO. Ln(1+Lagged IndVolume)×All-star dummy is an interaction of Ln(1+Lagged IndVolume) and the all-star dummy. The other explanatory variables are defined in Table 2-1. Year fixed effects based on the IPO year and industry fixed effects based on the 49 Fama-French industries are included, where the coefficients are not reported for brevity. Interaction term VIF reports the variance inflation factor for the interaction term in the corresponding regression. The *t*-statistics (in parentheses) are computed using heteroskedasticity-consistent standard errors that are corrected for clustering across year and industry.

Table 2-6. IPO Underpricing Regressions with Venture Capital and All-star Analyst Coverage

	(1) All IPOs	(2) 1993–1998	(3) 1999–2000	(4) 2001–2008	(5) All IPOs
Top-tier dummy	4.82	3.22	13.70	4.04	4.48
	(1.68)	(1.33)	(0.91)	(2.78)	(1.65)
Ln(Assets)	-2.54	-2.05	-4.32	-0.98	-2.40
	(-3.47)	(-5.69)	(-2.18)	(-1.58)	(-3.60)
Internet dummy	24.01	29.51	23.75	0.83	23.42
	(4.81)	(1.77)	(6.44)	(0.30)	(5.39)
Share overhang	4.74	2.34	8.72	2.02	4.71
	(3.34)	(6.15)	(3.41)	(3.64)	(3.32)
VC dummy	2.88	-1.12	21.54	5.34	4.13
	(1.37)	(-0.89)	(5.71)	(2.92)	(1.73)
All-star dummy	1.53	0.72	9.40	0.54	-14.78
	(0.60)	(0.45)	(0.71)	(0.29)	(4.77)
VC×All-star dummy	18.03	11.58	13.98	0.94	11.17
	(5.59)	(3.32)	(1.06)	(0.20)	(2.61)
Industry-year *Q*	-	-	-	-	11.29
					(4.22)
Industry-year *Q* ×All-star dummy	-	-	-	-	6.07
					(3.99)
Ln(1+Lagged IndVolume)	-	-	-	-	-0.05
					(-0.03)
Ln(1+Lagged IndVolume) ×All-star dummy	-	-	-	-	2.82
					(3.93)
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes
Interaction term VIF	1.97	1.69	3.54	1.62	-
N	4,510	2,796	853	861	4,510
R^2_{adj}	28.3%	14.9%	21.2%	13.0%	29.1%

The sample in columns 1 and 5 includes 4,510 U.S. IPOs from 1993–2008. Columns 2 to 4 include subperiod results for 1993–1998, 1999–2000, and 2001–2008, respectively. The dependent variable in all OLS regressions is the percentage first-day return. The VC×All-star dummy is an interaction of the venture capital (VC) dummy with the All-star dummy. The other explanatory variables are defined in Table 2-1. Year fixed effects based on the IPO year and industry fixed effects based on the 49 Fama-French industries are included, where the coefficients are not reported for brevity. The *t*-statistics (in parentheses) are computed using heteroskedasticity-consistent standard errors that are corrected for clustering across year and industry.

Table 2-7. IPO Underpricing Regressions with All-star Analyst Interactions Sorted by VC Category

	VC		Non-VC	
Variable	Estimate	t-Stat	Estimate	t-Stat
Panel A: Using Table 2 (column 1) model specification				
Ln(Assets)	0.51**	(0.40)	-2.01	(-4.92)
All-star dummy	59.54**	(4.43)	11.53	(0.96)
Ln(Assets)×All-star dummy	-12.12**	(-10.18)	-1.62	(-0.91)
Panel B: Using Table 2 (column 2) model specification				
Ln(1+Age)	1.10	(0.57)	-0.67	(-1.04)
All-star dummy	18.73	(1.61)	7.56	(0.93)
Ln(1+Age)×All-star dummy	-3.57	(-0.57)	-1.87	(-0.82)
Panel C: Using Table 2 (column 3) model specification				
Tech dummy	-9.57	(-1.10)	-4.95	(-2.78)
All-star dummy	-1.32	(-0.93)	0.09	(0.08)
Tech dummy×All-star dummy	19.12	(11.01)	10.47	(1.48)
Panel D: Using Table 2 (column 4) model specification				
Industry-year Q	7.08	(1.69)	8.39	(2.10)
All-star dummy	2.52	(0.33)	-17.08	(-2.13)
Industry-year Q×All-star dummy	4.06	(7.42)	12.48	(2.32)
Panel E: Using Table 3 (column 1) model specification				
All-star dummy	7.86**	(3.04)	-0.49	(-0.26)
Num. of firms covered×All-star dummy	0.60	(5.07)	0.38	(1.41)
Panel F: Using Table 3 (column 2) model specification				
All-star dummy	9.89**	(3.01)	-0.25	(-0.19)
Busy dummy×All-star dummy	6.60	(3.77)	8.06	(1.21)
Panel G: Using Table 4 (column 3) model specification				
Ln(1+Lagged IndVolume)	-0.96	(-0.24)	-1.35	(-1.19)
All-star dummy	-2.93	(-0.37)	-5.81	(-1.58)
Ln(1+Lagged IndVolume)×All-star dummy	4.66	(2.13)	3.58	(1.57)
N		1,751		2,759

The sample includes 4,510 U.S. IPOs from 1993–2008, where 1,751 IPOs are backed by VCs and 2,759 IPOs are not backed by VCs. Panels A to G present regression results for subsamples based on whether IPOs are VC-backed or not. The model specification used for each panel is specified in the panel title. The dependent variable in all OLS regressions is the percentage first-day return. Only coefficients on the relevant variables are presented, where coefficients on the other variables are not reported for brevity. The *t*-statistics (in parentheses) are computed using heteroskedasticity-consistent standard errors that are corrected for clustering across year and industry. Coefficients in the VC-sample are denoted by ** if they are statistically different from their counterparts in the non-VC sample at the 5% level or better. Explanatory variables are defined in Table 2-1.

Table 2-8. IPO Underpricing Regressions with Industry Expertise Variables

	(1)	(2)	(3)
Top-tier dummy	2.31	2.14	2.16
	(1.19)	(1.15)	(1.13)
Ln(Assets)	-2.47	-2.42	-2.47
	(-3.84)	(-3.85)	(-3.79)
Internet dummy	26.63	26.59	26.70
	(4.97)	(5.04)	(4.95)
Share overhang	3.35	3.34	3.36
	(2.82)	(2.81)	(2.83)
VC dummy	3.69	3.65	3.69
	(1.85)	(1.83)	(1.85)
All-star dummy	9.55	9.50	9.56
	(2.53)	(2.53)	(2.52)
Ln(1+Number of industry IPOs)	-1.53	-1.48	-1.15
	(-2.27)	(-2.08)	(-1.63)
Industry experience	1.77	-	-
	(3.50)		
High industry experience dummy	-	5.68	-
		(9.56)	
Top-5 dummy	-	-	3.47
			(3.60)
Year fixed effects	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
N	7,319	7,319	7,319
R^2_{adj}	28.1%	28.1%	28.1%

The sample consists of 7,319 U.S. IPOs from 1980–2008 meeting criteria listed in Table 2-1. The dependent variable in all OLS regressions is the percentage first-day return. Ln(1+Number of industry IPOs) is the natural logarithm of one plus the number of IPOs in the same Fama-French 49 industry underwritten in the five years before the IPO. Industry experience is the natural logarithm of one plus the number of IPOs in the same Fama-French 49 industry underwritten by the lead underwriter in the five years before the IPO. High industry experience dummy equals one (zero otherwise) if the lead underwriter has underwritten more than five IPOs in the same industry in the five years before the IPO. Top-5 dummy equals one (zero otherwise) if the lead underwriter is one of the five top underwriters in the given industry based on the number of IPOs underwritten in the five years before the IPO. The All-star dummy is set to zero for IPOs from 1980–1992. The other explanatory variables are defined in Table 2-1. Year fixed effects based on the IPO year and industry fixed effects based on the 49 Fama-French industries are included, where the coefficients are not reported for brevity. The *t*-statistics (in parentheses) are computed using heteroskedasticity-consistent standard errors that are corrected for clustering across year and industry.

Table 2-9. IPO Underpricing Regressions with Issuer-specific HHI

	(1) 1980–2008	(2) 1993–2008	(3) 1980–1989	(4) 1990–1998	(5) 1999–2000	(6) 2001–2008
Top-tier dummy	2.40	4.72	-2.48	3.12	14.68	5.32
	(1.25)	(1.70)	(-3.46)	(1.74)	(0.93)	(2.66)
Ln(Assets)	-2.50	-3.00	-1.07	-2.17	-5.59	-1.08
	(-3.78)	(-3.75)	(-3.56)	(-5.34)	(-3.09)	(-1.75)
Internet dummy	26.52	24.22	-2.01	28.77	23.30	0.86
	(4.95)	(4.95)	(-0.62)	(1.88)	(3.46)	(0.30)
Share overhang	3.34	4.86	0.26	2.18	8.67	2.04
	(2.81)	(3.38)	(1.20)	(6.07)	(3.21)	(3.78)
VC dummy	3.69	5.79	0.30	0.14	24.87	5.56
	(1.85)	(1.93)	(0.57)	(0.13)	(3.19)	(4.08)
All-star dummy	9.58	8.27	-	4.32	17.50	0.77
	(2.52)	(2.56)		(2.71)	(4.47)	(0.59)
Top-5 dummy	3.50	4.81	1.05	3.65	7.45	-0.15
	(3.44)	(5.20)	(3.18)	(1.75)	(1.81)	(-0.12)
Issuer-specific HHI	5.05	14.82	2.27	8.95	43.45	5.01
	(2.81)	(4.45)	(1.15)	(2.26)	(2.65)	(1.06)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	7,319	4,510	2,006	3,599	853	861
R^2_{adj}	28.1%	28.0%	5.2%	14.6%	21.3%	13.1%

The full sample consists of 7,319 U.S. IPOs from 1980–2008. The dependent variable in all OLS regressions is the percentage first-day return. For each IPO, its Issuer-specific HHI is the sum of the squares of the market shares of underwriters that are matched with the issuer on the basis of top-tier status, size, and industry. The All-star dummy is set to zero for IPOs from 1980–1992. The other explanatory variables are defined in Table 2-1. Year fixed effects based on the IPO year and industry fixed effects based on the 49 Fama-French industries are included, where the coefficients are not reported for brevity. The *t*-statistics (in parentheses) are computed using heteroskedasticity-consistent standard errors that are corrected for clustering across year and industry.

Table 2-10. IPO Underpricing Regressions with Non-price Dimension Variables Sorted by VC Category

	1980–2008		1993–2008	
	VC	Non-VC	VC	Non-VC
	(1)	(2)	(3)	(4)
Top-tier dummy	2.92	2.17	4.74	5.40
	(1.79)	(0.79)	(2.03)	(1.15)
Ln(Assets)	-1.54	-2.17	-2.08	-2.62
	(-1.68)	(-3.56)	(-1.74)	(-2.92)
Internet dummy	17.70	27.77	15.49	26.81
	(6.09)	(3.11)	(10.27)	(2.97)
Share overhang	5.68	1.79	7.85	2.63
	(2.87)	(3.89)	(3.77)	(5.26)
All-star dummy	14.09	3.17	10.82	2.37
	(3.34)	(1.23)	(2.76)	(1.02)
Top-5 dummy	5.18	2.24	7.24	2.51
	(2.56)	(2.51)	(3.16)	(1.72)
Issuer-specific HHI	5.69	3.92	17.58	11.95
	(1.93)	(2.03)	(2.12)	(3.12)
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
N	2,557	4,762	1,751	2,759
R^2_{adj}	33.1%	16.8%	32.0%	16.5%

Columns 1 and 2 include 7,319 U.S. IPOs from 1980–2008 and columns 3 and 4 include 4,510 IPOs from 1993–2008. The samples are partitioned by VC-backing status. The dependent variable in all OLS regressions is the percentage first-day return. The All-star dummy is set to zero for IPOs from 1980–1992. The other explanatory variables are defined in Table 2-1. Year fixed effects based on the IPO year and industry fixed effects based on the 49 Fama-French industries are included, where the coefficients are not reported for brevity. The *t*-statistics (in parentheses) are computed using heteroskedasticity-consistent standard errors that are corrected for clustering across year and industry.

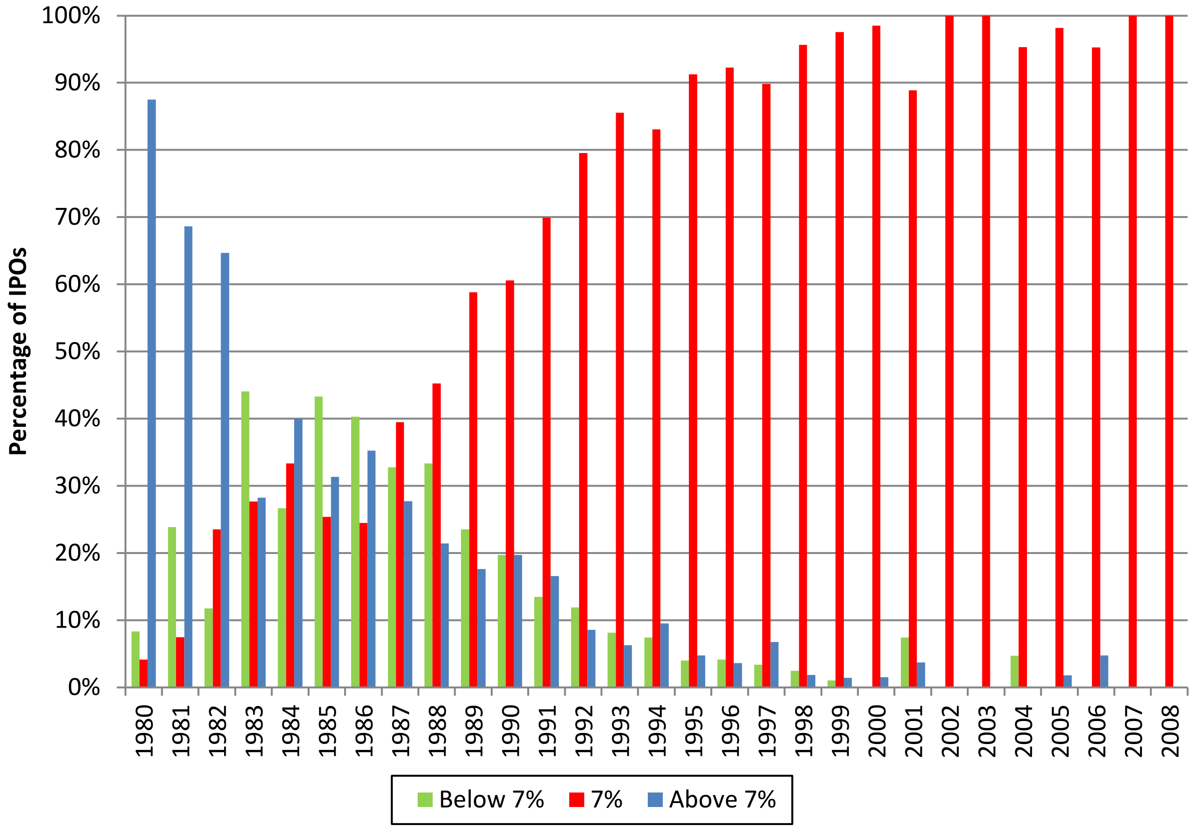

Figure 2-1. Gross Spread Distribution for Moderate Size IPOs. The sample consists of 3,564 U.S. IPOs from 1980 to 2008 with proceeds of at least $20 million but less than $80 million (expressed in terms of dollars of 1998 purchasing power, the equivalent of $28 million to $110 million in 2010 purchasing power, using the Consumer Price Index). IPOs using auctions, bank and S&L IPOs, SPACs, REITs, closed-end funds, partnerships, ADRs, unit offers, and IPOs with an offer price of less than $5 are excluded. The percentages of IPOs with a gross spread below 7%, equal to 7%, and above 7% are plotted.

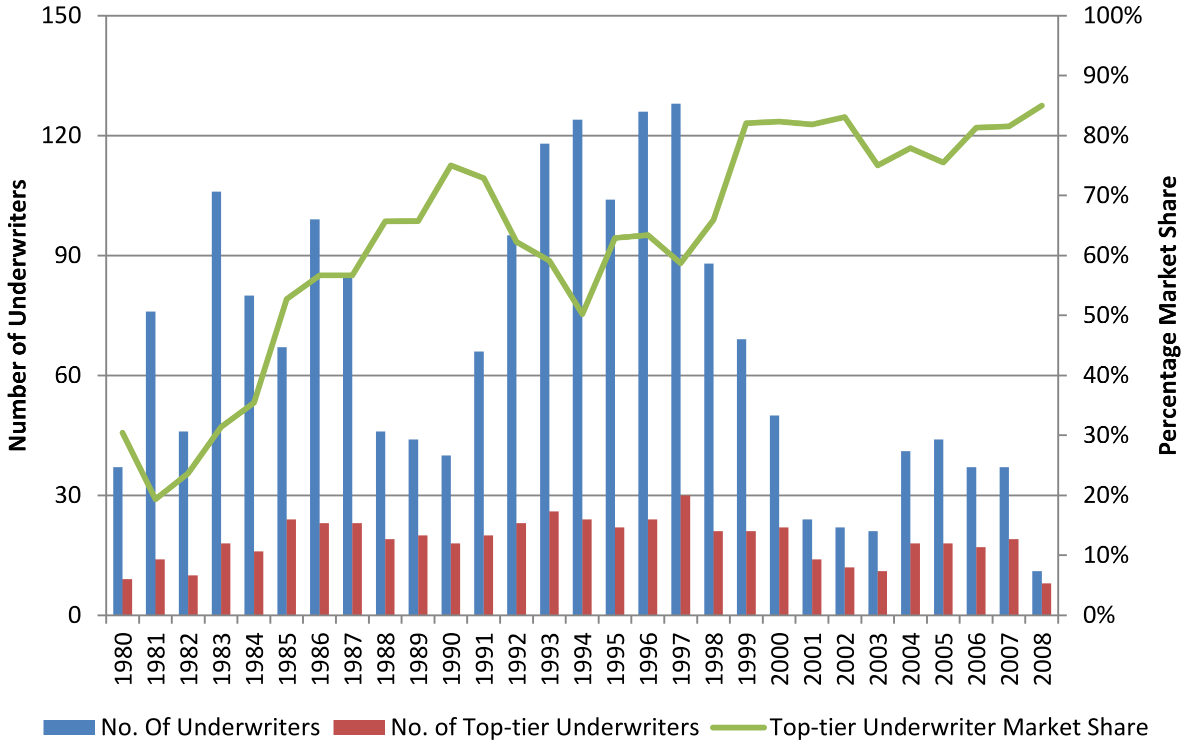

Figure 2-2. Number of IPO Lead Underwriters. The sample consists of 7,319 IPOs from 1980 to 2008 with an offer price of at least $5 and meeting other criteria specified in Figure 1. The number of unique lead underwriters and the number of unique top-tier lead underwriters that have taken a company public during a given calendar year is plotted. The top-tier underwriter's market share is calculated as the ratio of the number of IPOs underwritten by top-tier underwriters to the total number of IPOs underwritten in a given year. Top-tier underwriters have an updated Carter-Manaster ranking of 8 or above on a 0-9 scale.

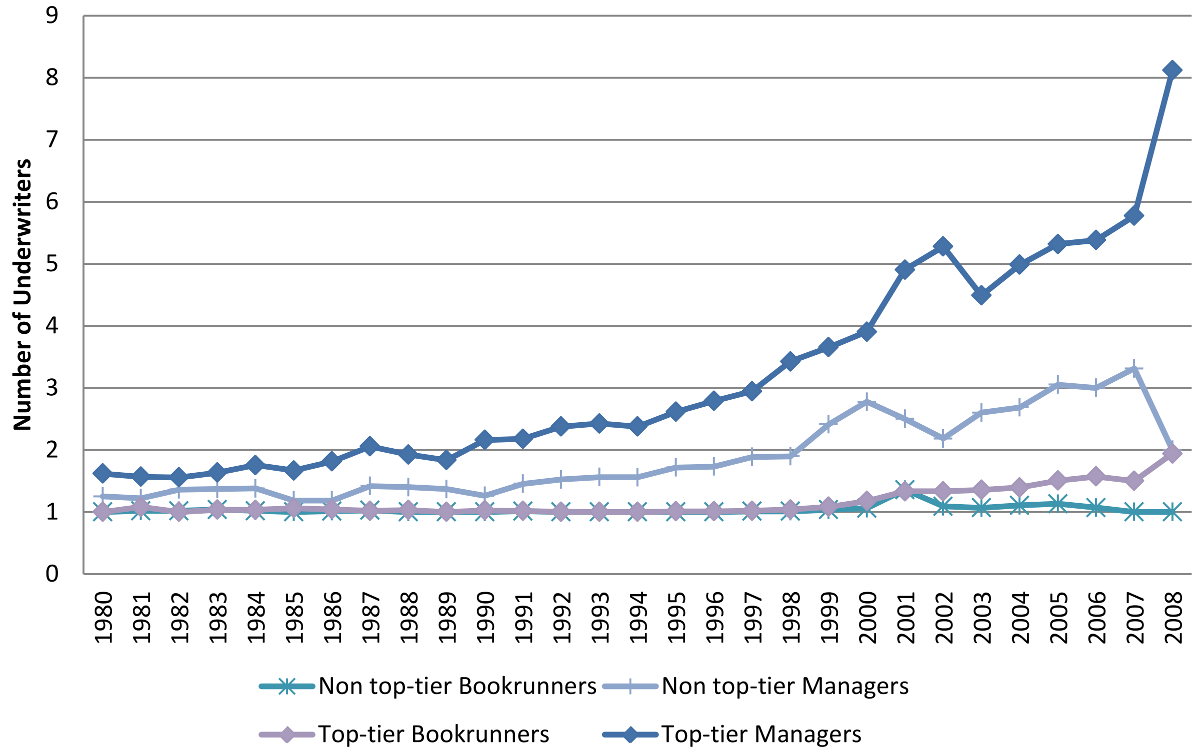

Figure 2-3. Yearly Average Number of Bookrunners and Managing Underwriters per IPO. The sample consists of 7,319 IPOs from 1980 to 2008 with an offer price of at least $5 and meeting other criteria. The average number of bookrunners and managers per IPO are calculated categorized by whether the IPO is underwritten by at least one top-tier bookrunner.

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