

# “Underpricing, Tie-Ins, and the IPO Bubble: Some Empirical Evidence”

Robert M. Hull  <https://orcid.org/0000-0002-0045-9773>

 <https://publons.com/researcher/1372838/robert-hull/>

## AUTHORS

Robert Kerchner  
Sungkyu Kwak  
Rosemary Walker

## ARTICLE INFO

Robert M. Hull, Robert Kerchner, Sungkyu Kwak and Rosemary Walker (2005). Underpricing, Tie-Ins, and the IPO Bubble: Some Empirical Evidence. *Investment Management and Financial Innovations*, 2(1)

## RELEASED ON

Wednesday, 23 March 2005

## JOURNAL

"Investment Management and Financial Innovations"

## FOUNDER

LLC “Consulting Publishing Company “Business Perspectives”



NUMBER OF REFERENCES

0



NUMBER OF FIGURES

0



NUMBER OF TABLES

0

© The author(s) 2026. This publication is an open access article.

# Underpricing, Tie-Ins, and the IPO Bubble: Some Empirical Evidence

Robert M. Hull, Robert Kerchner, Sungkyu Kwak, Rosemary Walker

## Abstract

We analyze underpricing in the United States surrounding the time of the collapse of the IPO market in the last quarter of 2000. During this quarter, the press gave insider accounts about how profits (from extreme underpricing) were made through illegal tie-ins in the IPO aftermarket. These allegations motivate our research as we seek to find out what impact they had on underpricing. Our research hypothesis is that the allegations will lead to overpricing. In our analysis, we use a different methodology. First, we offer different underpricing measures than used previously. Second, we compare IPO underpricing with a standard given by the SEO market. Third, we focus on dollar underpricing as opposed to percentage underpricing. This focus is consistent with our aim to examine the amount of profit-taking in the IPO aftermarket. Prior to the allegations, we find underwriters and preferred clients could have made over half the money raised by the firm. However, this profit-taking made in the IPO aftermarket dissipates at the time of the allegation and shortly after. Consistent with our research hypothesis, we find significant positive overpricing during this period (which lasts about six months). However, after this period, underpricing reverts to historical norms. In addition to offering support for our research hypothesis, we show how setting the offer price relative to an ex ante price (i.e., average price range) impacts underpricing. Finally, we find that the inclusion of high-tech or Internet IPOs has little influence on our findings.

**Key words:** initial public offerings, underpricing, tie-ins, IPO bubble, seasoned offerings, and underwriter compensation.

**JEL Classification:** D82-G14-G32-G34.

## 1. Introduction

Underpricing refers to selling shares below their fair value. Jenkinson and Ljungqvist (2001) write that underpricing for initial public offerings (IPOs), as measured by first-day returns, averaged 15% prior to 1999 in the United States (U.S.). Fueled by Internet stocks, IPOs averaged 65% during 1999-2000. The unprecedented level of IPO underpricing for 1999-2000 is the most recognized feature of what we will call the "IPO bubble". This bubble can be likened to classic bubbles such as the 17<sup>th</sup> century "tulip bubble" in Holland or the 18<sup>th</sup> century "South Sea bubble" in England.

Even though 2000 surpassed 1999 in the money raised by IPOs, it was also a year marked by allegations of misconduct associated with excessive IPO underpricing. For example, an SEC bulletin on August 25, 2000 warned about illegal tie-in agreements to purchase shares in the IPO aftermarket<sup>1</sup>. Even though the number of IPOs began decreasing about this time, there was still a belief that the IPO market might heat up again. This belief was at a high when on December 5, 2000 the NASDAQ Composite Index turned in a record percentage gain while the DJIA rose 339 points. However, the next day on December 6, *The Wall Street Journal (WSJ)* gave insider accounts on how underwriters operated tie-ins with preferred clients to buy shares in the IPO aftermarket. Purportedly, preferred customers received underpriced shares by paying excessive brokerage fees when partaking in a scheme supporting a price run-up in the IPO aftermarket.

The allegations about excessive IPO profits motivate our research. We examine if there are factual dollar underpricing numbers to support the allegation that excessive profits were made in IPO aftermarket. During the quarter that the SEC warning was issued, we find that underwriters

---

<sup>1</sup> Writing in Red Herring, May 2, 2001, "The Art of the Tie-In", Eric Moskowitz anonymously quotes insiders who provide details on how price manipulation can result through tie-ins agreements repurchase shares in the IPO aftermarket. To buy allotted shares at the initial offer price of \$17, one portfolio manager promised to later buy shares at \$40. By that time, they had flipped their shares bought at \$17 and made over a million dollars. The shares they bought in the aftermarket at \$40 (which supports price increases through amplified demand) could have been sold at \$60 within the next few days.

and preferred clients could have conceivably made half the amount of money raised by the issuing company. We next investigate the impact of the allegations on the subsequent underpricing numbers. Using the seasoned offerings (SEOs) aftermarket as a standard, we find statistical significant evidence consistent with overpricing. The overpricing persists for six month periods before underpricing returns to its normal pre-IPO bubble levels. We also find that the setting of the offer price relative to an *ex ante* price (i.e., average price range) can influence underpricing. While the inclusion of high-tech offerings energizes the IPO bubble, we can find no convincing evidence that they explain our findings. The inclusion of Internet IPOs has virtually no affect on our findings.

In Section 2, we look at the conditions and arguments for the huge IPO profits. Section 3 reviews the prior issue costs research, while Section 4 describes our underpricing measures, research hypothesis, and tests. In Section 5, we present our sample and give descriptive statistics. Section 6 contains empirical findings, and Section 7 provides conclusions.

## **2. Conditions and Arguments for Huge IPO Underpricing Profits**

In this section, we describe conditions during the period of the red-hot IPO market that could have led to enormous IPO profits. After doing this, we explore the arguments justifying these profits.

### ***2.1. Conditions Leading to Underpricing Profits***

What environmental conditions might enable underwriters to reap huge profits from the IPO market that reached its zenith in money raised during the year 2000? First, the internal environment within a company changed in the late 1990s. Wilhelm and Ljungqvist (2003) argue that insider holdings became smaller and more fragmented thus reducing key decision-makers' incentives to control underpricing. Second, the external environment changed as investor demand for IPOs seemed to know no rational limits. This demand created a situation where underwriters could conceivably collude with preferred customers to jointly capitalize on the anticipated stock price run-up in the IPO aftermarket. Any prearranged buying by preferred customers would not only fuel the aftermarket price run-up but also add to the underpricing if measured beyond the opening day closing price.

The above environmental changes arguably influenced agency and asymmetry factors that affected how IPOs were structured and executed. For example, if firms undergoing IPOs have fewer insiders involved and if the demand by non-preferred clients is abnormally high, then asymmetric information situations (involving these parties) fail to curtail profits. This is because those with greater knowledge about demand for shares (investment bankers and their preferred clients) can better take advantage of those with less knowledge (issuing companies absent adequate inside ownership and overzealous investors who buy after the stock price manipulation).

### ***2.2. Economic Justification for Underpricing Profits***

There are justifiable reasons for large underpricing. First, large underpricing may be a necessary reward for those providing truthful input on the current IPO. Jenkinson and Ljungqvist (2001) note that a red-hot IPO market makes it more imperative to gather truthful input from potential investors. In the U.S., investors cannot be rewarded through price discrimination because all must legally pay the same price. Benveniste, Busaba, and Wilhelm (1996) suggest that price support can replace price discriminate. In essence, price support can help investment bankers sustain price run-ups that lead to desirable profits.

Second, large underpricing is desirable as a means of rewarding past loyalty. Researchers (Benveniste and Spindt, 1989; Benveniste and Wilhelm, 1990) point out that U.S. underwriters behave strategically in the allocation of IPOs apportioning favorable IPOs to customers who partake in unfavorable IPOs. Among these customers are institutional investors. Researchers (Hanley and Wilhelm, 1994; Aggarwal, Prabhala, and Puri, 2002) suggest that institutional investors capture a large fraction of the short-run profits associated with IPOs.

Third, large underpricing may lead to lower future costs. Researchers (Welch, 1989; Jegadeesh, Weinstein, and Welch, 1993) suggest that greater IPO underpricing leads to a more favorable

market reaction for subsequent offerings. Consequently, fewer future costs (including future underpricing) may result from larger underpricing today.

### 3. Prior Underpricing Research

Raising cash through stock offerings entails not only the direct cash costs of the offering (e.g., underwriting fees, selling commissions, legal expenses) but also other costs stemming from lost employee time, warrants, reallocation, over-allotment option, and underpricing. In this section, we discuss underpricing which is the focus of our study.

#### 3.1. Defining Underpricing

Underpricing refers to selling shares below their true price. For SEOs, the true price can be estimated *ex ante* by looking at the closing market price the day before the offer date. For IPOs, the average price range (or midpoint of the filing price range) can be used as the *ex ante* representative of the true price. Lowry and Schwert (2003) examine if public information is incorporated in the preliminary price range. They conclude that underwriters' treatment of public information appears to be almost consistent with an efficient IPO pricing process. Despite any argument favoring an *ex ante* price to estimate the true price, IPO underpricing is traditionally computed using *ex post* prices. Whether an *ex ante* or *ex post* estimate is assumed to be the true price, the offer price would have to be set below the true price to facilitate the sale of the new shares.

#### 3.2. IPO Versus SEO Underpricing

Underpricing for IPOs has been well documented (Ritter, 1987; Ibbotson, Ritter, and Sindelar, 1994; Demers and Lewellen, 2003) and is more extreme than that found for SEOs. As discussed by Jenkinson and Ljungqvist (2001), there is overwhelming evidence of underpricing in IPOs throughout the world. As measured by first day returns, underpricing averages about 15% in industrialized countries and about 60% in emerging markets where greater uncertainty exists.

SEO researchers have not always included underpricing when examining issue costs. Loderer, Sheehan, and Kadlec (1991) and Hull and Kerchner (1996) are two exceptions. Hull and Kerchner (1996) extend the SEO issuance costs research of Hull and Fortin (1993/1994) by including OTC firms along with AMEX and NYSE firms. They measure underpricing as the loss in value resulting from selling a share below its market price. They show that issue costs including underpricing increase as firm size decreases. They find that underpricing is 2.97% of the new offer value. However, when just small OTC firms (which are more similar in size to IPO firms) are examined, they find that the percentage underpricing is 4.26%.

Hull and Kerchner (2000) expand on the relationship between issue costs and firm size. They offer a model explaining over half of the variability in issue costs with firm size the key variable. Firm size itself is highly related to most other factors that significantly impact issue costs. The recognition of size is important because IPOs are much smaller firms subject to greater costs associated with the issuance process including underpricing. Thus, larger underpricing is more justifiable for IPOs than would be expected for larger SEOs. Because the historical norm for IPO underpricing has been documented as about 15% prior to 1999 in industrialized countries, one might conclude that this is the standard risk-adjusted norm that excessive underpricing must surpass. This 15% norm is three times the SEO norm that Hull and Kerchner (1996) suggest for OTCs.

### 4. Underpricing Measures, Research Hypothesis, and Tests

In this section, we describe our various underpricing measures. We then present our research hypothesis and empirical tests used to make conclusions about the impact of the allegations on profit-taking in the IPO aftermarket.

#### 4.1. *Ex Ante and Ex Post Underpricing Measures*

Like Hull and Kerchner (1996), we look at underpricing from the issuer's viewpoint and design our underpricing equation to compute a negative number to capture the loss. For IPOs, we measure underpricing *ex ante* by assuming the true price is the average price range. For SEOs, we measure underpricing *ex ante* by assuming the true price is the closing market price the day before the offer day. For both IPOs and SEOs, we measure underpricing *ex post* by assuming the true price can be taken as the closing price one week after the offering. In one week's time, an IPO is officially declared "completed" and the money raised can no longer be returned to investors. Our one-week *ex post* underpricing measure will not only capture the underpricing effect caused by setting the offer price below the true price but will also capture any collusive tie-in effect for that one week.

Table 1

#### Underpricing Measures

Panel A. Initial Public Offerings (IPOs)	
<i>Ex Ante Measure</i>	Starting Point: Offer price minus the average price range (or midpoint of price range). Purpose: Determine how much offer price is set below true price if average price range is the true price.
<i>Ex Post Measure</i>	Starting Point: Offer price minus the closing price one week after the offer date. Purpose: Determine how much offer price is set below true price if closing price one week after is true price and, if present, simultaneously include collusive price run-up.
Panel B. Seasoned Offerings (SEOs)	
<i>Ex Ante Measure</i>	Starting Point: Offer price minus the closing price the day before the offer date. Purpose: Determine how much offer price is set below true price if closing price the day before is the true price and establish an <i>ex ante</i> underpricing benchmark to compare with IPO <i>ex post</i> underpricing.
<i>Ex Post Measure</i>	Starting Point: Offer price minus the closing price one week after the offer date. Purpose: Determine how much offer price is set below true price if closing price one week after is true price and establish an <i>ex post</i> underpricing benchmark to compare with IPO <i>ex post</i> underpricing.

Table 1 summarizes our *ex ante* and *ex post* underpricing measures. The starting point is the per share underpricing at the time of offering and (as will be seen) is the major component of our "dollar underpricing" and "percentage underpricing" computations. The purpose for each underpricing measure is also given in Table 1. The purpose can involve more than just measuring underpricing. For example, including an *ex post* SEO measure also establishes a benchmark for how a security aftermarket might behave absent tie-in irregularities<sup>1</sup>. An important spin-off of having an *ex ante* price will be seen later when we use the *ex ante* price (in place of the offer price) in an attempt to estimate the underpricing attributable to collusive tie-in agreements. For example, if the *ex ante* price is the true price then the price run-up in the IPO aftermarket relative to the *ex ante* price can be attributed to collusion and not due to setting the offer price below the true price.

#### 4.2. *Dollar Underpricing and Percentage Underpricing*

In our tests, we use two computations for each underpricing measure given in Table 1. Our major underpricing computation is "dollar underpricing" which is the dollar change in the value of the offering. Although results are not reported in detail, we also compute "percentage underpricing" which is the percentage change in the value of the offering.

<sup>1</sup> The benchmark does not portend to estimate what the average IPO aftermarket should be (because SEO underpricing will be expected to be only one-third IPO underpricing for every time period) but to show what happens during a designated time period when there are no irregularities as are alleged to occur in the IPO aftermarket.

For dollar underpricing, the dollar change in offer value is the “starting point” (offer price minus the *ex ante* or *ex post* price) times the number of new shares offered. The dollar change in offer value represents the dollar cost from selling below an estimate of the true price. The firm’s cost corresponds to the potential gain to those who buy at the offer price and sell at the (higher) true price. If it is true that investment bankers and preferred customers capture these gains through their pre-arranged tie-in schemes, then a measure of underpricing that involves the dollar change enables us to compute a maximum amount of profits for these parties. We divide the “starting point” by the offer price when computing percentage underpricing. Dividing by the offer price (as opposed to *ex ante* or *ex post* price) is consistent with prior research’s computation of IPO percentage underpricing. We should point out that stocks with smaller offer prices can generate huge percentages compared to stock with higher prices even though their dollar underpricing values are the same.

#### 4.3. Research Hypothesis and Statistical tests

For SEOs, no suspicion exists as to the secret dealings between investment bankers and customers buying a new offering. If so, we can use underpricing for SEOs as a suspicion-free standard to help us make inferences about potential gains from underpricing in the IPO aftermarket. With this in mind, then prior to the allegations we hypothesize that IPO underpricing will cause greater losses for the issuing firm compared to the benchmark represented by SEO underpricing. Thus, we expect significant negative statistics when comparing the loss in value from IPO underpricing with that for SEO underpricing. If the allegations have validity, we hypothesize that overpricing will occur. This brings us to our research hypothesis which is: *IPO dollar underpricing after the illegal tie-in allegations will be significantly positive when compared to SEO dollar underpricing.*

In forming conclusions about dollar underpricing that compares IPOs with SEOs, we will report on non-paired, one-tailed *t* tests. We report one-tailed tests because our research hypothesis has a definite sign (positive) as to its prediction. We will also conduct these *t* tests with high-tech and internet firms deleted as well as *t* tests for differences between quarters. Variances for all *t* tests will be assumed unequal if the *F* test rejects the hypothesis that variances are equal.

### 5. Sample and Descriptive Statistics

In this section, we describe our sample of 256 IPOs and 350 SEOs. We give descriptive statistics for key variables for each of our five quarters.

#### 5.1. Sample

We draw our sample from firms undergoing firm commitment IPOs or SEOs from April 1, 2000 to June 30, 2001. This period includes five quarters. Throughout this paper we will designate these quarters as: Q1 is 4/1/00 to 6/30/00; Q2 is 7/1/00 to 9/30/00; Q3 is 10/1/00 to 12/31/00; Q4 is 1/1/01 to 3/31/01; and, Q5 is 4/1/01 to 6/30/01. Q3 is the pivotal quarter because it is the quarter immediately following the SEC warning of illegal tie-ins. It is also the quarter during which allegations were published by *WSJ*. Q1 and Q2 are the two quarters preceding this pivotal quarter and Q4 and Q5 are the two quarters following it. For brevity’s sake, we focus only on these five quarters surrounding the allegations. However, we can point out that (i) the *ex post* underpricing from January 1, 1999 up to when we begin, is similar to what we will later report for the quarter prior to the allegation (Q2), and (ii) the underpricing for the years after our last quarter (Q5) is similar to what we will later report for this last quarter.

Table 2

## Descriptive Statistics for Quarters

Quarter Offering Type (Number)	Offer Price	Ex Ante Price	Ex Post Price	New Shares	Offer Value	Common Stock Value	Firm Value	Offer Value /Firm Value
<u>Q1: 4/1/00–6/30/00</u>								
IPOs (n=85)	\$13.97 (\$13.00)	\$15.30 (\$15.00)	\$20.44 (\$15.50)	9.99M (5.00M)	\$162M (\$63M)	\$321M (\$100M)	\$438M (\$151M)	61.25% (37.12%)
SEOs (n=69)	\$35.49 (\$31.00)	\$37.32 (\$32.13)	\$36.30 (\$33.00)	11.04M (4.00M)	\$477M (\$109M)	\$3,569M (\$1,041M)	\$4,468M (\$1,179M)	10.98% (8.57%)
<u>Q2: 7/1/00–9/30/00</u>								
IPOs (n=73)	\$16.84 (\$15.00)	\$16.08 (\$13.00)	\$27.51 (\$20.38)	8.54M (5.50M)	\$147M (\$85M)	\$470M (\$185M)	\$551M (\$219M)	60.65% (37.56%)
SEOs (n=52)	\$44.06 (\$35.00)	\$45.30 (\$37.19)	\$45.47 (35.69)	11.62M (3.80M)	\$350M (\$135M)	\$4,475M (\$1,808M)	\$9,341M (\$1,846M)	9.37% (6.86%)
<u>Q3: 10/1/00–12/31/00</u>								
IPOs (n=52)	\$14.03 (\$13.25)	\$14.98 (\$14.00)	\$15.35 (\$14.47)	21.85M (6.46M)	\$313M (\$84M)	\$522M (\$237M)	\$738M (\$311M)	29.24% (23.87%)
SEOs (n=72)	\$39.52 (\$30.03)	\$41.01 (\$32.57)	\$41.20 (\$32.92)	18.22M (4.60M)	\$601M (\$150M)	\$9,047M (\$1,909M)	\$11,886M (\$1,150M)	7.98% (6.84%)
<u>Q4: 1/1/01–3/31/01</u>								
IPOs (n=20)	\$10.90 (\$10.50)	\$12.55 (\$13.00)	\$11.37 (\$11.18)	40.40M (7.00M)	\$311M (\$85M)	\$583M (\$163M)	\$706M (\$287M)	33.68% (21.93%)
SEOs (n=68)	\$33.97 (\$26.09)	\$34.90 (\$26.88)	\$34.94 (\$28.06)	9.67M (6.00M)	\$302M (\$155M)	\$4,486M (\$1,222M)	\$6,464M (\$1,661M)	6.95% (5.49%)
<u>Q5: 4/1/01–6/30/01</u>								
IPOs (n=26)	\$18.32 (\$15.50)	\$17.83 (\$15.00)	\$20.69 (\$17.56)	23.97M (9.00M)	\$603M (\$140M)	\$3,547M (\$467M)	\$5,161M (\$689M)	26.57% (16.26%)
SEOs (n=89)	\$29.17 (\$23.68)	\$30.09 (\$23.81)	\$30.46 (\$25.20)	11.15M (4.55M)	\$293M (\$121M)	\$4,678M (\$849M)	\$8,140M (\$1,198M)	10.24% (8.77%)

Means (medians) are given for eight key variables for each of the five quarters from April 1, 2000 to June 30, 2001 with M referring to million. *Offer Price* is the initial price at which the new shares sell on the offer day. We expect the offer price to be set below the true price to ease the selling of the new offering. The *Ex Ante Price* is the estimate of the true price using data prior to the offer date. For IPOs, we use the average price range as the *ex ante* price. For SEOs, we use the closing price the day before the offer date as the *ex ante* price. The *Ex Post Price* is the estimate of the true price using data after the offer date. For both IPOs and SEOs, we use the closing price one calendar week after the offer date as the *ex post* price. The closing price one week after will capture irregularities such as tie-ins that occur during the first week of trading. *New Shares* are the number of new shares issued; it does not include over-allotted shares, which are typically 15% of *New Shares*. *Offer Value* is the initial dollar value of the new offering. It is computed by multiplying *Offer Price* times *New Shares*. *Common Stock Value* is the stock price nearest to the date of the offering times the number of shares outstanding at that time (if available, we use prices and shares outstanding prior to the offer date). *Firm Value* includes common stock value, the liquidation value of preferred stock (if applicable), and the book value of long-term debt obligations and current liabilities. For the last three variables, we find missing *Compustat* data for about one in ten observations.

The primary source of this study's sample is the *Investment Dealers' Digest (IDD)*. For IPOs, the *IDD* reports information on the offer date, offer value, average price range, offer price, and closing price a week after the offer date. For SEOs, the *IDD* gives data on the offer date, offer value, market price one day before the offer date, and offer price. Besides the *IDD*, we use Compustat and various online sources such as Yahoo Finance, Edgar Online, Inc. and Hoover's Online.

### 5.2. Descriptive Statistics by Quarter

Table 2 gives descriptive statistics by quarter for key variables and reveals that SEO values generally show little change over time compared to IPOs. However, unlike SEOs, the number of IPOs tail off. While one might conclude that the drop-off in the number of IPOs is proof the allegations have helped burst the IPO bubble, the total amount of money raised by IPOs renders a different conclusion as the amount of money raised for Q1 and Q2 is similar to Q4 and Q5.

Besides the drop-off in the number of IPOs, the change in the IPO environment is also indicated by looking at the *Offer Price* and *Ex Post Price* columns. The difference between the offer price and the *ex post* price (i.e., the closing price a week later) for IPOs narrows considerably by the time we get to Q3. In looking at the *Offer Value* column, the greater average amounts for IPOs for Q3 and Q4 (relative to Q2) reflect the fact that several larger firms can have a greater magnification effect on the average amount due to smaller sample sizes. Only for the last quarter (Q5) we can say that the offer value for an IPO is typically greater than a SEO (as the IPO median of \$140 million is greater than the SEO median of \$121 million). The last three columns of Table 2 reveal that the size of IPO firms tends to increase over time while their offerings, as a percentage of firm value, tend to fall over time. In contrast, SEO values do not show any distinctive trend for our time period of study.

## 6. Empirical findings

In this section, we report our empirical findings. These findings provide evidence supporting our research hypothesis.

### 6.1. Dollar Underpricing Results when Analyzing Quarters

Table 3 gives quarterly results that focus on the dollar amount of underpricing. Before computing the underpricing results, we first adjusted prices at the end of the period for the changes in the market as represented by the NASDAQ Composite Index. For example, if the price at the end of the period is \$20 and the NASDAQ Composite Index reported a decrease of  $-2.5\%$  over the length of the period, the price is increased  $2.5\%$  to estimate its price absent no market decrease<sup>1</sup>.

The negative means in the “*Ex Ante Dollar Underpricing*” column are generally consistent with the notion that the offer price should be set below the true value as represented by the *ex ante* price<sup>2</sup>. The two exceptions are Q2 and Q5 for IPOs. The next column gives *ex post* dollar underpricing results. For Q2, the possible loss from underpricing of  $-\$77.88$  million to the issuing IPO firm is over half the amount of the average offer value of \$147 million given in Table 2. Thus, for the quarter prior to the *WSJ* allegations, the potential gain to investment bankers and preferred clients is over half the money raised by the issuing firm. For the pivotal quarter (Q3), the mean *ex post* dollar underpricing declines to  $-\$1.18$  million and for the first time is less than SEOs (which has an average loss in value for the week after the offering of  $-\$42.54$  million). This indicates overpricing for IPOs if the SEO underpricing mean is taken as the norm. The same overpricing holds for Q4. These *ex post* overpricing results are consistent with our research hypothesis.

The results for Q5 in the “*Ex Post Dollar Underpricing*” column reveal that the elimination of any alleged profit for investment bankers and preferred clients in the IPO aftermarket is short-lived because its average dollar loss per offering from underpricing is  $-\$46.04$  million. This *ex post* underpricing average for IPOs during Q5 is over four times the  $-\$10.70$  million average found for SEOs. The IPO change from  $-\$2.14$  million in Q4 to  $-\$46.04$  million in Q5 is a  $-\$43.90$  million reversal in underpricing. This reversal is even more striking if we note the SEO change from Q4 to Q5 is the opposite direction with a  $+\$7.69$  million reversal.

<sup>1</sup> For *ex ante* computations, we use the percentage change in index for one day even though for IPOs the offer price would be expected to be set more than one day after the average price range is last announced. Regardless, the skyrocketing increase in IPO prices, any standard market index adjustment is not likely to be noticed.

<sup>2</sup> In actuality, this notion appears to be only true for IPOs that occur during non-IPO bubble periods. For example, we examined 419 IPOs for the five IPO-bubble quarters prior to when our study begins and found that the average *ex ante* dollar underpricing was  $+\$17.98$  million. For seven non-IPO bubble quarters after our study ends, we examined 140 IPOs and found that the average *ex ante* dollar underpricing was  $-\$19.58$  million.

As reasoned earlier, if the *ex ante* price is the true price, measuring underpricing from the *ex ante* price should better capture just that portion of underpricing that results from collusive tie-ins. The results using the *ex ante* price in place of the offer price is found in the last column. The large mean negative values for Q1 and Q2 in this column indicate bubble-like underpricing can occur strictly from the price run-up in the IPO aftermarket. If so, then this is further evidence that the underpricing for Q1 and Q2 is consistent with collusive behavior. The last column further shows that IPO underpricing for Q3 and Q4 would have been positive (indicating overpricing) if the *ex ante* price had been used. Thus, if the *ex ante* price is indeed the true price, there is no indication of collusion for Q3 and Q4. Regardless, it appears that setting the offer price below the *ex ante* price not only prevents overpricing for Q3 and Q4 but also enables some limited profit-taking in the aftermarket by those who buy at the offer price and hold for one week. We should point out that outliers cause the large IPO means in the last column for Q3 and Q4, as the medians tend to be close to zero. We can also note that the positive means (albeit driven by outliers) in the last column for Q3 and Q4 have an absolute value similar to the *ex ante* dollar underpricing values of  $-\$18.84$  million and  $-\$31.93$  million in the “*Ex Ante Dollar Underpricing*” column. Had IPO underwriters used the average price range (instead of the lower offer price) then those who sold one week later would have suffered losses. Whereas underwriters and their preferred clients may have given up profit opportunities in the aftermarket for Q3 and Q4 by not manipulating stock prices, they did not suffer huge losses as would have occurred if the offer price had been set closer to the average price range.

Table 3

## Dollar Underpricing by Quarters

Quarter Offering Type (Number)	<i>Ex Ante Dollar Un- derpricing</i>	<i>Ex Post Dollar Underpricing</i>	<i>Ex Post Dollar Underpricing if Offer Price Set at Ex Ante Price</i>
<u>Q1: 4/1/00–6/30/00</u>			
IPOs (n=85)	-\$10.55M (-\$6.18M)	-\$48.76M (-\$16.06M)	-\$38.16M (-\$0.01M)
SEOs (n=69)	-\$22.35M (-\$5.52M)	-\$6.47M (-\$7.52M)	+\$15.31M (+\$0.01M)
<u>Q2: 7/1/00–9/30/00</u>			
IPOs (n=73)	+\$4.94M (+\$5.77M)	-\$77.88M (-\$25.36M)	-\$83.65M (-\$41.39M)
SEOs (n=52)	-\$1.69M (-\$1.47M)	-\$9.01M (-\$2.98M)	-\$7.62M (-\$0.37M)
<u>Q3: 10/1/00–12/31/00</u>			
IPOs (n=52)	-\$18.84M (-\$4.52M)	-\$1.18M (-\$9.05M)	+\$17.43M (-\$0.61M)
SEOs (n=72)	-\$22.58M (-\$4.68M)	-\$42.54M (-\$7.98M)	-\$19.16M (-\$3.69M)
<u>Q4: 1/1/01–3/31/01</u>			
IPOs (n=20)	-\$31.93M (-\$8.46M)	-\$2.14M (-\$5.38M)	+\$28.29M (+\$2.81M)
SEOs (n=68)	-\$7.96M (-\$3.52M)	-\$18.39M (-\$9.26M)	-\$10.66M (-\$5.69M)
<u>Q5: 4/1/01–6/30/01</u>			
IPOs (n=26)	+\$13.03M (+\$4.12M)	-\$46.04M (-\$15.48M)	-\$58.84M (-\$20.45M)
SEOs (n=89)	-\$7.00M (-\$0.86M)	-\$10.70M (-\$3.81M)	-\$2.46M (+\$0.29M)

Means (medians) are given for three dollar underpricing variables for each of the five quarters from April 1, 2000 to June 30, 2001 with M referring to million. “*Ex Ante Dollar Underpricing*” attempts to capture the extent of the underpricing based upon the estimate of the true price at the time of the offering. It is computed by subtracting the *ex ante* price (i.e., the average price range for IPOs and closing price the day

before for SEOs) from the offer price and multiplying this quantity by the number of new shares. We view this dollar value as the loss in value necessary to make sure all shares are sold and so should be a negative value. “*Ex Post Dollar Underpricing*” attempts to capture the extent of the underpricing based upon the estimate of the true price after the offer day. This variable is computed by subtracting the *ex post* price (i.e., the closing price one week after the offer day) from the offer price and multiplying this quantity by the number of new shares. This computation produces a negative value for a price increase in the one-week aftermarket as the increase captures an opportunity loss to the company (in terms of potential revenues loss from setting the offer price too low). The “*Ex Post Underpricing if Offer Price Set at Ex Ante Price*” attempts to capture what *ex post* underpricing would have been if the *ex ante* price had been used for the offer price. Assuming the *ex ante* price is the true price, this variable measures the stock price run-up in the aftermarket due to factors (e.g., tie-ins) other than setting the offer price too low. All three variables are adjusted for changes in the market (given by the NASDAQ Index) as described in this section.

For Q5, if underwriters had kept to the *ex ante* price when setting the offer price, then the underpricing would have been  $-\$58.84$  million instead of  $-\$46.04$  million. Regardless, the  $-\$46.04$  million average per offering indicates that underpricing is again generating profit opportunities even though underwriters may be consciously suppressing the full potential amount of the underpricing. Thus, the collusive price run-ups involving preferred clients can be reoccurring (albeit the underpricing is reduced by setting the offer price high). Whereas the setting of the offer price for Q3 and Q4 allowed some limited profit-taking, the setting for Q5 lowered potential profit-taking.

### 6.2. Percentage Underpricing Results when Analyzing Quarters

We repeat the dollar underpricing tests in Table 3 by using the percentage change variable. For brevity's sake and these percentage underpricing results mirror the dollar underpricing results, we do not put these results in table format but only briefly summarize them. Like the dollar underpricing results, the percentage results suggest that underpricing is more variable from quarter to quarter for IPOs compared to SEOs. As expected from viewing Table 3, the IPO *ex ante* underpricing percentage peaks (in a negative sense) at  $-12.84\%$  during Q4. Once again, this suggests that because money cannot be made in the IPO aftermarket, it is best to set the offer price below the average price range by as much as possible. Most noteworthy, the IPO *ex post* underpricing percentage changes dramatically from Q2 to Q3 before bottoming out by Q4 suggesting that the allegations (shortly before and during Q3) could be a key instigating factor for abatement of the huge IPO aftermarket profits after Q2. Under the assumption that the IPO pricing process is efficient, results using the *ex ante* price suggests that the underpricing for Q4 would have even attained a positive percentage ( $+6.65\%$  versus  $-7.56\%$ ) if the offer price had been set at the true price as represented by the *ex ante* price.

### 6.3. Statistical Results

Table 4 presents results for statistical tests. These tests assume that SEO underpricing is a suspicion-free benchmark useable to help test for a significant change in IPO aftermarket pricing behavior.

#### 6.3.1. Results Comparing IPOs and SEOs

Table 4 reports underpricing results when testing if IPO underpricing values are significantly different from SEO values. For each panel, the first cell for each of the last five columns reports results for “*Ex Post Dollar Underpricing*” values while the second cell for each of these columns gives results for “*Ex Post Underpricing if Offer Price Set at Ex Ante Price*” values. The first number in each cell is the difference when subtracting the *SEO Mean* from the *IPO Mean* (with M = millions). This difference is called the *Fine-Tuned IPO Mean (FIM)* as it “fine-tunes” or adjusts IPO underpricing for SEO underpricing. The second number is the *t* statistics for the non-paired, one-tailed *t* test. Our research hypothesis predicts a positive *t* statistics for Q3 and Q4 due to overpricing caused by the allegations. Otherwise, we always predict a negative *t* statistics especially with IPO-bubble level underpricing. The third number gives the significant level for the

*t* test. Panel A reports results for the total sample. Panel B reports results with high-tech IPOs deleted<sup>1</sup>. Panel C reports results with Internet IPOs deleted.

The “*Ex Post Underpricing*” row in Panel A reveals that *FIM* values (i.e., mean differences in *ex post* dollar underpricing between IPOs and SEOs) change over time. As expected, the *FIM* values are substantially negative for Q1 and Q2. The positive *FIM* values for Q3 and Q4 indicate overpricing in the IPO aftermarket when we adjust for what happens in the SEO aftermarket for these two quarters. However, the IPO underpricing resurfaces for the last quarter (Q5) where the negative *FIM* of  $-\$35.34$  million is similar to the  $-\$42.29$  million found for the first quarter (Q1). One can note that *FIM* changes from  $+\$41.36$  million in Q3 to  $+\$16.25$  million in Q4. This is a negative change of  $-\$25.11$  million ( $+\$16.25 - +\$41.36 = -\$25.11$ ) and indicates underpricing is picking up again. One can further note that *FIM* changes from  $+\$16.25$  million in Q4 to  $-\$35.34$  million in Q5, which indicates underpricing is continuing to pick up as this is a negative change of  $-\$51.59$  million ( $-\$35.34 - +\$16.25 = -\$51.59$ ). However, both of these numbers ( $-\$25.11$  million and  $-\$51.59$  million) are together less (in absolute magnitude) than the positive change of  $+\$111.16$  million ( $+\$42.29 - -\$68.87 = +\$111.16$ ) when going from quarter before the allegations (Q2) to that for the first quarter expected to be impacted by the allegations (Q3).

Table 4

Statistical Results when Comparing IPO and SEO Underpricing Values

	Q1	Q2	Q3	Q4	Q5
<b>Panel A</b>					
	(n=85; n=69)	(n=73; n=52)	(n=52; n=72)	(n=20; n=68)	(n=26; n=89)
<i>Ex Post Underpricing</i>	$-\$42.29M;$ $-2.20; 0.015$	$-\$68.87M;$ $-3.11; 0.001$	$+\$41.36M;$ $+1.73; 0.043$	$+\$16.25M;$ $+1.52; 0.066$	$-\$35.34M;$ $-1.60; 0.060$
<i>Ex Post Underpricing if Offer Price Set at Ex Ante Price</i>	$-\$53.47M;$ $-2.23; 0.014$	$-\$76.03M;$ $-3.07; 0.001$	$+\$36.59M;$ $+1.60; 0.050$	$+\$38.95M;$ $+2.10; 0.020$	$-\$56.38M;$ $-2.03; 0.026$
<b>Panel B</b>					
	(n=32; n=40)	(n=32; n=36)	(n=27; n=56)	(n=17; n=54)	(n=22; n=76)
<i>Ex Post Underpricing</i>	$-\$21.64M;$ $-0.73; 0.234$	$-\$81.08M;$ $-2.19; 0.017$	$+\$30.39M;$ $+1.88; 0.031$	$+\$11.02M;$ $+1.28; 0.104$	$-\$41.62M;$ $-1.62; 0.060$
<i>Ex Post Underpricing if Offer Price Set at Ex Ante Price</i>	$-\$22.76M;$ $-0.78; 0.229$	$-\$93.54M;$ $-2.31; 0.013$	$+\$22.21M;$ $+1.39; 0.084$	$+\$17.03M;$ $+1.31; 0.097$	$-\$65.27M;$ $-2.01; 0.028$
<b>Panel C</b>					
	(n=56; n=69)	(n=48; n=52)	(n=47; n=72)	(n=19; n=68)	(n=22; n=89)
<i>Ex Post Underpricing</i>	$-\$38.33M;$ $-2.01; 0.023$	$-\$76.41M;$ $-2.54; 0.007$	$+\$45.38M;$ $+1.86; 0.033$	$+\$15.70M;$ $+1.43; 0.078$	$-\$32.18M;$ $-1.25; 0.112$
<i>Ex Post Underpricing if Offer Price Set at Ex Ante Price</i>	$-\$50.97M;$ $-1.92; 0.028$	$-\$84.09M;$ $-2.52; 0.007$	$+\$39.55M;$ $+1.68; 0.048$	$+\$36.21M;$ $+1.91; 0.030$	$-\$54.36M;$ $-1.69; 0.053$

This table reports underpricing results when testing if IPO underpricing values are significantly different from SEO underpricing values. For each panel, the first cell for each of the last five columns reports results for “*Ex Post Dollar Underpricing*” values while the second cell for each of these columns gives results for “*Ex Post Underpricing if Offer Price Set at Ex Ante Price*” values. The first number in each cell is the difference when subtracting the *SEO Mean* from the *IPO Mean* (with M = millions). This difference is called the *Fine-Tuned IPO Mean (FIM)* as it “fine-tunes” or adjusts IPO underpricing for SEO underpricing. The second number is the *t* statistics for the non-paired, one-tailed *t* test when examining our research hypothesis that predicts a positive *t* statistics for Q3 and Q4 due to overpricing caused by the allegations.

<sup>1</sup> In identifying high-tech firms, we follow Loughran and Ritter (2001) who state that high-tech companies are active in SIC codes 3571, 3572, 3575, 3577, 3578 (computer hardware), 3661, 3663, 3669 (communications equipment), 3674 (electronics), 3812 (navigation equipment), 3823, 3825, 3826, 3827, 3829 (measuring and controlling devices), 4899 (communication services), and 7370, 7371, 7372, 7373, 7374, 7375, 7378, and 7379 (software).

Otherwise, we always predict a negative  $t$  statistics especially with IPO-bubble level underpricing. The third number gives the significant level for the  $t$  test. Panel A reports results for total sample. Panel B reports results with high-tech IPOs deleted. Panel C reports results with Internet IPOs deleted.

The next two numbers in the “*Ex Post Underpricing*” row in Panel A report that  $t$  statistics are negative and significant at the 0.015 level for Q1, the 0.001 level for Q2, and the 0.060 level for Q5. This indicates significant IPO underpricing compared to SEO underpricing for these quarters. Consistent with our research hypothesis, the  $t$  statistic for Q3 and Q4 is both positive and significant at near the 0.05 level indicating overpricing when comparing IPOs and SEOs. Even though the *FIM* of  $-\$35.34$  million in Q5 is less than found in Q1 and Q2 (albeit similar to Q1), it is consistent with the notion that large underpricing is needed by the investment banking industry as compensation for taking on high levels of risk when bankrolling IPOs.

The “*Ex Post Underpricing if Offer Price Set at Ex Ante Price*” row in Panel A repeats the tests given for the “*Ex Post Underpricing*” row but replaces the offer price with the *ex ante* price when testing underpricing. As argued previously, if the *ex ante* price is the true price, these tests are better designed to capture the collusive tie-ins resulting from underpricing. Overall, the statistical results in these two rows offer even stronger evidence to support the impact of the allegations. This is especially true for Q4, where the overpricing is significant at near the 0.01 level. This test offers the strongest support for our research hypothesis that the allegations lead to overpricing.

We repeat our tests in Panel A with high-tech firms omitted because these firms are reported to have greater underpricing owing to their inclusion of Internet stocks. For these tests, Panel B reports that most *FIM* values and  $t$  statistics are similar (albeit weakened a bit) compared to those in Panel A. Panel C repeats the tests in Panel A but eliminates Internet IPOs. The results for these tests are very similar to Panel A revealing that our findings are not driven by including Internet firms.

### 6.3.2. Other Statistical Tests

We performed other statistical tests but due to space constraints, we only summarize them. First, we repeated the tests in Table 4 comparing “*Ex Post Dollar Underpricing*” values for IPOs with “*Ex Ante Dollar Underpricing*” values for SEOs (instead of with “*Ex Post Dollar Underpricing*” values for SEOs). The mean comparisons now assume that *ex ante* SEO underpricing does a better job of accounting for true underpricing than *ex post* SEO underpricing (even though *ex ante* SEO underpricing does not capture any one-week aftermarket effect). While these tests can differ in some details, the overall results are consistent with those reported in Table 4. We also repeated the tests in Table 4 using percentage underpricing instead of dollar underpricing. These tests produce parallel results to those found in Table 4 and further verify that the allegations reversed the underpricing trend for a six-month period.

We next perform  $t$  tests to determine if *ex post* underpricing values for IPOs are statistically different between quarters. While informative, the results may be viewed as lacking precision because, unlike Table 4, they do not take into consideration what the SEO market is doing. The non-paired one-tailed  $t$  tests reveal that underpricing values for Q1 and Q2 are each statistically significant from those for Q3 (the pivotal quarter) and Q4. Also, Q5 is statistically significant from Q3 and Q4 indicating a return to underpricing.

### 6.3.3. Evidence Summarized

We now summarize our findings. First, we show high levels of underpricing for the two quarters prior to when the allegations are publicly announced by the financial press. For Q2, the last quarter of bubble level profit-taking in the IPO aftermarket, investment bankers and preferred clients could have made over half as much money as raised by IPOs. They could have made even more money during Q2 if the offer price had been set, on average, below the *ex ante* price (as is normally the case).

Second, consistent with our research hypothesis, we find indication of significant positive overpricing for the two quarters (Q3 and Q4) hypothesized to be affected by the tie-in allegations. These results support the notion that the allegations drastically changed the behavior of those parties involved in the IPO issuance process. Furthermore, for those buying and selling during Q3 and

Q4, more extreme losses in the IPO one-week aftermarket are avoided by judiciously setting the offer price below *ex ante* price (i.e., average price range).

Third, IPO aftermarket price run-ups reappear after about a half year of overpricing. The price run-ups associated with underpricing were somewhat controlled by setting the offer price at a relatively higher level. Lastly, we find no compelling evidence that high-tech or Internet firms explain the profit-taking in the IPO aftermarket.

## 7. Concluding Remarks

We conclude that our results support our research hypothesis as we found overpricing in the IPO aftermarket following the allegations that underwriter and preferred customers were involved in illegal tie-in activities. Compared to what is happening in the SEO market, anyone buying and selling in the IPO market shortly after the issuance would have likely sustained losses. The allegations at the very least appear to hasten the bursting of the bubble. Thus, the tie-in allegations will likely be forever inseparably linked with the bursting of bubble. Fortunately for the IPO industry, their losses were minimized, not so much because underwriters cut back on the number of IPOs since total offering value did not fall, but because underwriters are able to judiciously lower the offer price below its expected level (as given by the average price range).

Any reversal in IPO underwriting profits was short-lived because the potential for profits in the IPO aftermarket began surfacing within the second quarter after the *WSJ* accusations. This indicates that the decreased demand for IPOs (that would accompany the allegations and the bursting of the IPO bubble) may not be the sole cause of the decrease in underpricing that occurred at the time the allegations were made. Even though high-tech and Internet IPOs experienced the greatest underpricing during the IPO bubble, their inclusion in our tests do not account for our findings.

We can attribute the resurfacing of any IPO aftermarket profits to several factors. First, it is difficult to unequivocally prove if stock prices were manipulated. Thus, there is nothing to really prevent underwriters from returning to normal historical levels of underpricing once the negative news subsides. Second, the markets realize that investment bankers must make profits to stay in business. The market only requires that investment bankers police themselves so that the companies they serve and potential investors (other than preferred clients) are not taken to the "cleaners" on a regular basis.

## References

1. Aggarwal, R., Prabhala, N., and Puri, M. (2002). "Institutional Allocation in IPOs: Empirical Evidence," *Journal of Finance*, Vol. 57, pp. 1421-1442.
2. Benveniste, L., Busaba, W., and Wilhelm, Jr., V. (1996). "Price Stabilization as a Bonding Mechanism in New Equity Issues," *Journal of Financial Economics*, Vol. 14, pp. 223-255.
3. Benveniste, L., and Spindt, P. (1989). "How Investment Bankers Determine the Offer Price and Allocation of New Issues," *Journal of Financial Economics*, Vol. 24, pp. 343-361.
4. Benveniste, L., and Wilhelm, Jr., W. (1990). "A Comparative Analysis of IPO Proceeds under Alternative Regulatory Environments," *Journal of Financial Economics*, Vol. 28, pp. 173-207.
5. Demers, E., and Lewellen, K. (2003). "The Marketing Role of IPOs: Evidence from Internet Stocks," *Journal of Financial Economics*, Vol. 68, pp. 413-437.
6. Hanley K., and Wilhelm, Jr., W. (1994). "Evidence on the Strategic Allocation of Initial Public Offerings," *Journal of Financial Economics*, Vol. 37, pp. 239-257.
7. Hull, R., and Fortin, R. (1993/1994). "Issuance Expenses and Common Stock Offerings for Over-the-Counter Firms," *Journal of Small Business Finance*, Vol. 3, pp. 1-17.
8. Hull, R., and Kerchner, R. (1996). "Issue Costs and Common Stock Offerings," *Financial Management*, Vol. 25, pp. 54-66.

9. Hull, R., and Kerchner, R. (2000). "An *Ex Ante* Model to Estimate Issue Costs," *Journal of Research in Finance*, Vol. 2, pp. 131-168.
10. Jegadeesh, N., Weinstein, M., and Welch, I. (1993). "An Empirical Investigation of IPO Returns and Subsequent Equity Offerings," *Journal of Financial Economics*, Vol. 34, pp. 153-175.
11. Ibbotson, R., Ritter, J., and Sindelar, J. (1994). "The Market's Problems with the Pricing of Initial Public Offerings," *Journal of Applied Corporate Finance*, Vol. 7, pp. 66-74.
12. Jenkinson, T., and Ljungqvist, A. *Going Public: The Theory and Evidence on How Companies Raise Equity Finance*, Second Edition, Oxford University Press, Oxford, England, 2001, 241 pp.
13. Loderer, C., Sheehan, D., and Kadlec, G. (1991). "The Pricing of Equity Offerings," *Journal of Financial Economics*, Vol. 29, pp. 35-57.
14. Lowry, M., and Schwert, G. (2003). "Is the IPO Pricing Process Efficient?" *Journal of Financial Economics*, Vol. 71, pp. 3-26.
15. Moskowitz, E. (2001). "The Art of the Tie-In." *Red Herring*, May 2, 2001.
16. Pulliam, S. (2000). "Seeking IPO Shares, Investors Make Offer to Buy More in After-Market," *The Wall Street Journal*, December 6, 2000.
17. Welch, I. (1989). "Seasoned Offerings, Imitation Costs, and the Underpricing of Initial Public Offerings," *Journal of Finance*, Vol. 44, pp. 421-449.
18. Wilhelm, Jr., W., and Ljungqvist, A. (2003). "IPO Pricing in the Dot-Com Bubble," *Journal of Finance*, Vol. 58, pp. 723-752.