

Biographical Notes

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Speculative Excesses in Initial Pricing of IPOS in the Secondary Market

by Nancy Beneda

Abstract

This paper examines the pricing of Initial Public Offerings (IPOs) in the secondary market on the first day of aftermarket trading. The focus of this study is on shifts in average returns over time, and does not necessarily address the cross-sectional implications of a risk/return relation. The focus of the study is to examine the reasonableness of first day trading prices of IPOs. Initial returns of IPOs, issued during the period, January 1, 1999 to June 30, 2000, reached as much as 800%, and the average initial return for the study sample was of 76%. An important question is whether the high initial returns, observed during this time period, are appropriate for the level of risk associated with these new issues. Related to this question is the pricing of these securities by investment bankers (i.e. the offer price) and the pricing of the securities in aftermarket trading (i.e. the secondary market). The results of this study indicate the presence of speculative excesses in the initial pricing of IPOs in aftermarket trading during 1999 and part of 2000. Further there is no indication that IPOs are excessively underpriced by investment bankers during the study period, January 1, 1997 through June 30, 2000. The results of this study may be useful to investors in making decisions about purchasing new public securities in the secondary market.

1. Introduction

The focus of this paper is the pricing of Initial Public Offerings (IPOs) in the secondary market on the first day of aftermarket trading. The study examines the reasonableness of these first day trading prices. The implication is that speculative excesses in the pricing of IPOs are present during aftermarket trading, during the period, 1999 and part of 2000. Further there is no indication that IPOs are excessively underpriced by investment bankers during the study period, January 1, 1997 through June 30, 2000.

Initial returns of IPOs, issued during the period, January 1, 1999 to June 30, 2000, reached as much as 800%, with a sample average initial return of 76%. An initial return of an IPO is the return to an investor who purchases the new stock from the underwriter (i.e. primary market) and then sells the stock in the secondary market on the first day of trading. This period is typically very short and often represents a one-day return to the investor. These high initial returns may, in large part, be a result of overly optimistic investors on the first day of trading.

The objective of the study is to examine shifts in average returns over time. Thus the study does not necessarily address the cross-sectional impli-

cations of a risk/return relation. An important question is whether these high initial returns are appropriate, for the level of risk associated with these new issues. The type of risk associated with new issues is not market (beta type) risk, but is related to the uncertainty regarding the true value of the new issues. New issues are not publicly traded and are difficult to value initially, by market participants. Highly related to this issue is the pricing of these securities by investment bankers (i.e. the offer price) and in aftermarket trading (i.e. the secondary market). The results of this study may be useful to institutional and individual investors who wish to invest in new public issues in primary and/or secondary markets.

2. Literature Review and Hypothesis Development

A large number of studies have examined the nature of IPO initial returns, some of which include Logue (1973); Ritter (1984); Ibbotson (1975); Ibbotson and Jaffe (1975); Beatty and Ritter (1986), Miller and Reilly (1987); Johnson and Miller (1988), Chalk and Peavy (1989); Saunders (1990); Carter and Manaster (1990); Megginson and Weiss (1991); Michaely and Shaw (1994); and Carter et al. (1998). Many of these studies refer to initial returns as underpricing. According to these studies underpricing an IPO issue is necessary, due to the risky nature of purchasing new issues, to insure that the entire issue is sold. The risk associated with new issues is not systematic beta-type risk, but is related to the uncertainty regarding the aftermarket pricing.

Several theories have been developed in the literature to explain the nature of initial returns of IPOs. One theory speculated in the literature is that initial returns of IPOs can be explained by a risk/return relationship (market equilibrium) as developed in Rock's (1985) model. Two competing theories which attempt to explain non-stationary initial returns are the *monopsony power hypothesis* (Rock 1985) and the *speculative bubble hypothesis* (Ritter 1984). The two latter theories suggest that IPO initial returns cannot be explained by market equilibrium phenomena, suggesting that IPO prices are manipulated and/or speculative excesses are present.

2A. Return/risk equilibrium hypothesis

Rock's (1985) risk/return market equilibrium model suggests that IPOs are priced correctly in both the primary market (i.e. offer price) and the secondary market (i.e. aftermarket trading). This model suggests that high risk offerings will have higher underpricing. Many of the studies which followed Rock (1985) focused on validating the *risk/return equilibrium hypothesis*.

A variety of measures have been used to measure the riskiness of IPOs in the primary market. Beatty and Ritter (1986), Johnson and Miller (1988), Carter and Manaster (1990), Megginson and Weiss (1991), Michaely and Shaw (1994), Carter, et al. (1998) document lower initial returns for IPOs underwritten by larger more prestigious investment bankers during the

1980s. The lower average initial returns of IPOs underwritten by larger investment bankers documented in studies on pre-1992 data has been attributed to the lower level of risk associated with these IPOs.

These same studies also documented a negative relationship between IPO size and initial return. Smaller IPOs were viewed in these studies as having more risk and are typically underwritten by small underwriters. It was speculated that smaller IPOs are more difficult to value, and thus were considered more risk. Other measures of risk include level of sales and volatility of aftermarket trading (Ritter 1984; Beatty and Ritter 1986; and Carter, Dark, and Singh 1998).

These studies have attempted to address the cross-sectional implications of Rock's (1985) model, as well as shifts in average initial returns over time. Although the literature tends to support a positive relation between risk and average initial returns, the relation is found to be highly nonstationary, over time. The current study focuses on shifts in average initial returns and the high initial returns of IPOs issued during 1999 and part of 2000.

2B. Monopsony power hypothesis

The *monopsony power hypothesis* suggests that underwriters intentionally underprice the issues and earn profits by allocating these issues only to favored customers (Rock 1985). This theory suggests that IPOs are correctly priced in the aftermarket and underwriters manipulate the offer price of an IPO in the primary market. Thus under the monopsony power hypothesis, there should be no crashes in the aftermarket, as the speculative bubble hypothesis implies.

The documented higher initial returns of smaller IPOs, underwritten by smaller investment bankers has been attributed to the reputation capital theory (Beatty and Ritter 1986; Johnson and Miller 1988; Carter and Manaster 1990; Megginson and Weiss 1991; Michaely and Shaw 1994; and Carter, et al. 1998). The premise of the reputation capital theory is that larger more prestigious underwriters will be motivated to more accurately price new issues in an effort to preserve their reputations. The reputation capital theory does not completely contradict the monopsony power hypothesis, because the former theory suggests that smaller, less prestigious underwriters underprice more than large investment bankers.

2c. Speculative bubble hypothesis

Ritter (1984) finds that during the period January 1, 1980 to March 30, 1981, natural resource issues exhibited an average initial return of 111%, while non-natural resource issues had an average initial return of only 21%. The *speculative bubble hypothesis* (Ritter 1984) suggests that IPO issues are priced appropriately by the investment banker and that high average initial returns result from speculative excesses in first day aftermarket trading.

This theory implies that there should be periods of sharp price drops in the aftermarket that cannot be explained by equilibrium phenomena in equity markets.

Similar to the high initial returns of natural resource IPOs, observed by Ritter (1984) during the period January 1, 1980 to March 30, 1981, the current study observes high initial returns during the period January 1, 1999 through June 30, 2000. The technology-related issues included in the sample, used in this study, had an average initial return of 115%, while non-technology IPOs exhibited an average initial return of 41%.

Ritter (1984) refers to the period, January 1, 1980 to March 30, 1981, as a “hot issues” period and finds that the shift in the average initial return was not caused by equilibrium phenomena. “Hot issues” refer to particular new stock issues that have risen from their offering prices to higher than average prices in the aftermarket. Ritter (1984) finds that the high initial returns, during this period, are consistent with speculative excesses in aftermarket trading. These high initial returns may, in large part, be a result of overly optimistic investors on the first day of trading.

This paper evaluates the pricing of IPOs over the period January 1997 through June 2000, by examining shifts in average initial returns during this period. The significance of the sample period is that a period of high initial returns can be observed during the period 1999 and part of 2000. The average initial return for the sample IPOs over the period January 1, 1999 through June 30, 2000 was 76%, versus 9.2% for IPOs issued during the period January 1, 1997 through December 31, 1998. The findings of this paper suggest that the excessive initial returns during 1999 and part of 2000 are caused by speculative excesses in aftermarket pricing. Thus, consistent with the findings of Ritter (1984), the current study finds no evidence that the high initial returns of the period, January 1999 through June 2000, are attributed to equilibrium phenomena. Further this study finds no indication that IPOs are excessively underpriced by investment bankers during the study period, January 1, 1997 through December 31, 2000.

3. Data and Sample Selection

3A. IPO data

The sample developed for this study is used to examine initial returns and aftermarket returns of IPOs underwritten during the period January 1, 1997 through June 30, 2000. The sample should consist of a non-trivial number of IPOs underwritten both prior to and during the period considered to be the “hot issues” period, January 1, 1999 through June 30, 2000. The focus of this study is on shifts in average returns over time, and does not necessarily address the cross-sectional implications of a risk/return relation. Thus, to mitigate survivorship bias, only large IPOs are included in the sample during this time frame. IPOs of \$100 million or larger were included in the sam-

ple for 1999 through 2000, with a cutoff of \$70 million for 1997 and 1998. This lower cutoff for the latter period is intended to insure a sufficient number of IPOs throughout the period, as the average issue size increased over this period. The sample accounts for approximately the top 20% of IPOs, categorized by size, during each year of the study period.

Data on variables, such as issuing company name, industry SIC code, size of issue, and offer price per share were obtained from the "Corporate Market Data" section of the *Investment Dealer's Digest* and/or Hoovers online IPO Central. The first-day unadjusted closing price, the first-day adjusted closing price, and post one-year adjusted closing price were obtained for each IPO from Reuters online. Adjusted closing prices represent closing prices for shares of stock adjusted for stock splits, stock dividends, and cash dividends. The *ex post* beta for each IPO was obtained from the S&P Compustat database. All data must be available for the entire sample period for each IPO.

3B. Market (index) and industry data

Of the 376 sample IPOs brought to market during the study period, 120 were in technology-related industries. Table 2, Panel A presents descriptions of these industries and corresponding SIC classification codes. To facilitate measurement standards for the technology-related IPOs (tech IPOs), a technology industry matched portfolio was created using 20 firms in matching industries. See Table 2, Panel B for a list of the twenty companies used in the portfolio, along with their industries and SIC classification codes. Daily closing prices for the twenty technology portfolio firms were obtained, for the study period from Reuters online, to facilitate the computation of portfolio prices to correspond with the first trading date and post one-year date for each tech IPO.

The Standard and Poor's 500 composite (S&P) was used as a measurement standard for the 256 IPOs in the sample which are not technology related (non-tech IPOs). S&P closing index prices were obtained to correspond with the first trading day and post one-year date for each non-tech IPO. If the one-year after market closing price for an IPO falls on a weekend or holiday, the next trading day prices were used for both IPO and index pricing. S&P index closing prices were also obtained for the offer date and first trading date for each IPO to facilitate the computation of market-adjusted initial returns. Standard and Poor's Composite 500 Indices were obtained from Reuters online. Standard and Poor's 500 composite is a value-weighted index, having a broad industry coverage and is used extensively by professional money managers and by academics.

3C. Sample description

The sample consists of 408 IPO's, which were in the Compustat database and brought to market during the period January 1, 1999 through June 30,

2000. See Table 1. A total of 32 IPOs were classified as merged or as “having gone private,” during the first year subsequent to going public, by the Compustat database. These IPOs were deleted from the sample since the pricing of these securities in merger transactions is difficult to assess and affected by criteria not related to the focus (i.i. performance) of this study. This resulted in a test sample of 376 IPOs. Of the 376 IPOs in the sample, 5 have subsequently completed bankruptcy proceedings and 27 have subsequently entered into bankruptcy proceedings, and one being classified as liquidated. All of these firms were kept in the sample, as the post one-year aftermarket performance of these firms is relevant to the study.

4. Methodology

This study focuses on evaluating first day aftermarket trading prices of IPOs. First the study examines the first year aftermarket performance of tech and non-tech IPOs on average. If the aftermarket performance of the IPOs, on average, is lower than the expected performance, this may indicate that IPO first-day trading prices, on average, were set too high. A second technique, used to evaluate aftermarket trading prices, involves computing and evaluating imputed initial returns.

If the actual initial returns, on average, are greater than the imputed initial returns, this may indicate that IPO first-day trading prices were set too high. The finding that actual initial returns are greater than implied initial returns, on its own, could also indicate the presence of excessive underpricing by investment bankers. However this finding in conjunction with aftermarket underperformance tends to support the presence of speculative excesses in first day trading. This conclusion would be further supported if the excess of the actual initial return over the implied initial return were comparable to the aftermarket underperformance of the IPOs.

A third test is performed to determine if the observed high initial returns have any impact on the aftermarket performance of the IPOs. If initial returns of IPOs are attributable to equilibrium phenomena, then one would expect there to be no relation between initial returns and aftermarket performance. Theory (Roek, 1985) suggests that the initial returns should be positively correlated with the risk associated with the uncertainty of the true value of the IPO. This is in contrast with the after-market performance of an IPO which is affected by market (beta type) risk (Bodie et al. 2004).

However, one might suspect that significant underperformance of IPOs in aftermarket trading might be a result of overpricing (i.e. speculative excesses) on the first trading day. In other words, significant initial overpricing in the secondary market might negatively affect the aftermarket performance of the IPOs as the prices tend to approach their true value in aftermarket trading. To test the relation between initial returns and aftermarket performance, regression models are used. Actual initial returns of IPOs

are regressed on the aftermarket, market-adjusted (for non-tech IPOs) and industry-adjusted (for tech IPOs) one-year returns.

4A. Aftermarket performance of IPOs

Two measurement standards are used to evaluate the one-year aftermarket performance of the IPOs: 1) *S&P one-year returns* for non-tech IPOs and 2) *Technology industry matched portfolio one-year returns* for tech IPOs. To facilitate measuring the aftermarket performance of the sample IPOs the *raw one-year returns* are computed for each IPO, as well as one-year returns for each of the two measurement standards. These formulations are described in the following sections (4A1, 4A2, and 4A3).

4A1. Actual raw one-year returns

An actual *raw one-year return* represents the return to an investor who purchases the IPO on the first day of aftermarket trading (in the secondary market) at the closing price and holds the security for one year. The *raw one-year return* is computed for each IPO as follows:

$$1) \text{ Raw one-year return} = (\text{post one-year adjusted closing price} - \text{first day adjusted closing price}) / \text{first day adjusted closing price}$$

Adjusted closing prices are used for performance measurement and to account for stock splits, stock dividends, and cash dividends.

4A2. S&P one-year returns

To evaluate the aftermarket performance of the non-tech IPOs versus a broad index, *Raw one-year returns* are compared with corresponding *S&P one-year returns*. The S&P closing prices on the first trading date and the post one-year date for each IPO are used to compute the *S&P one-year returns*, as follows:

$$2a) \text{ S\&P one-year return} = (\text{S\&P one-year index close} - \text{S\&P first day index close}) / \text{S\&P first day index close}$$

4A3. Technology industry matched portfolio one-year returns

Daily portfolio pricing, for the period of the study, was computed for the technology matched portfolio of twenty technology-related companies. See Table 2, Panel B, for a list of the technology firms included in the industry matched portfolio. Equal weighting of the twenty firms was assumed for the portfolio pricing. Using the computed daily portfolio prices, one-year returns for the portfolio were computed to correspond with the first trading date and post one-year date for each IPO.

$$2b) \text{ Technology industry matched portfolio one-year return} = (\text{Portfolio one-year price} - \text{Portfolio first day price}) / \text{Portfolio first day price}$$

4B. Imputed initial returns of IPOs

A second technique, used to evaluate the pricing of IPOs, is the computation and evaluation of *implied* initial returns. If overpricing of IPOs is present on the first aftermarket trading day, then one would expect that excess actual initial returns over computed implied initial returns should be comparable to the one-year aftermarket underperformance, on average. The study computes the imputed initial returns on an S&P market-adjusted basis for the non-tech IPOs. For the tech IPOs, the implied initial returns are computed, using the matched-industry performance as a measure of aftermarket performance. Implied initial returns are computed by geometrically removing the aftermarket adjusted one-year return from the *one-year return from offer price* for each IPO. See formulas 2a and 2b, above for the computations of these performance measures. The *one-year return from offer price* is the return to an investor who purchases the IPO at the offer price from the investment banker in the primary market and holds the security for one year in aftermarket trading. (The length of time may actually be greater than one year if institutional lag is present for the IPO.)

This is an *ex post* formulation, because it uses *ex post* S&P market index returns and *ex post* matched industry portfolio returns as measurement standards. Thus the methodology could have limitations regarding its use in evaluating initial returns. However, one would expect that, on average, IPOs should perform as well as a closely matched standard of measurement. Further, once IPOs begin trading on the exchanges, it is expected that the prices of the securities would tend to approach their true value. Thus it is expected that implied initial returns on average should be representative of appropriate initial returns of IPOs.

4B1. Actual market adjusted initial returns

First, market-adjusted initial returns are computed for each IPO. IPO initial returns are market-adjusted due to possible institutional lag. Institutional lag occurs when there is a delay, after the offer date, before the issue begins trading in the secondary market. In this case the initial return may be affected by changes in the market. For each IPO, a *Raw initial return* is calculated as:

$$3a) \text{ Raw initial return} = (\text{Unadjusted Closing Price} - \text{Offer Price}) / \text{Offer Price}$$

The unadjusted closing price represents the closing price on the first day of aftermarket trading for which a quotation could be found. The offer price is the offer price as reported in *Investment Dealer's Digest* or *Hoovers.com*. A corresponding *Initial S&P return* is calculated, for each IPO, as:

$$3b) \text{ Initial S\&P return} = [\text{S\&P Index (close)} - \text{S\&P Index (offer)}] / \text{S\&P Index (offer)}$$

S&P Index (offer) is the S&P closing price for the first date the IPO issue is offered and *S&P Index (close)* is the S&P closing price for the first date the IPO issue begins trading. The *market-adjusted initial return* is calculated for each IPO as follows:

$$3c) \text{ Market-adjusted initial return} = \text{Raw initial return} - \text{S\&P market return.}$$

4B2. One-year return from offer price

A *one-year return from offer price* is computed for each IPO.

$$4) \text{ One-year return from offer price} = [(1 + \text{Market-adjusted initial return}) * (1 + \text{Raw one-year return})] - 1$$

This formulation is derived on the basis that the investor who purchases the IPO from the investment banker and holds the stock issue for one-year, receives both the initial return and the one-year aftermarket return. However for this formulation the market-adjusted initial return, rather than the raw initial return, is used in conjunction with the raw one-year return. This is the correct formulation to use for measurement, because it facilitates the position that the initial return generally is a stationary return over a very short holding period and is only altered when there is a delay going to market. Thus there is little interest in measuring raw initial returns. However, the one-year return is over a longer holding period and is the return being evaluated under this methodology.

4B3. Implied initial returns

An implied initial return is computed by geometrically removing an estimated aftermarket return from the *one-year return from offer price* (see formula 4, above), for each IPO. Implied returns are computed on two bases of estimated aftermarket returns (S&P and industry matched). See formulas 2a and 2b for the aftermarket adjusted return formulations. The computations of these implied returns are as follows:

$$5a) \text{ S\&P implied initial return} = [(1 + \text{One-year return from offer price}) / (1 + \text{S\&P one-year return})] - 1$$

$$5b) \text{ Technology industry matched implied initial return} = [(1 + \text{One-year return from offer price}) / (1 + \text{Technology industry matched portfolio one-year return})] - 1$$

The methodology used in this study to compute implied initial returns predicates itself on the premise of risk/return equilibrium. The methodology suggests that the actual returns received by investors who purchase IPOs from the investment bankers and hold the issues for one year, should represent reasonable returns, on average, for the risk incurred. This is plausible in the sense that the market prices of IPOs will tend to move toward their intrinsic

sic (true) values, during the first year of trading after going public. Under this point of view, the returns from offer, on average, should include a reasonable market-adjusted initial return and aftermarket one-year return.

Thus the methodology presumes that the actual returns from primary market to post one-year secondary market are appropriate, on average. This presumption is supported by the concept of efficient markets (Bodie et al.). The results of this study are strengthened by two factors. First, one would expect that the aftermarket performance of the IPOs on average should be comparable to a closely matched standard of measurement. Second, the trading prices of the IPOs should tend to approach their intrinsic value over time. In this paper, lower than expected aftermarket returns and higher than expected actual initial returns indicate speculative excesses in first-day trading prices of IPOs.

4C. Regression of initial returns on aftermarket returns

A third test is performed to determine if the observed high initial returns have any impact on the aftermarket performance of the IPOs. One might expect that significant underperformance of IPOs in aftermarket trading may be a result of overpricing on the first trading day. In other words, significant initial overpricing in the secondary market might negatively affect the aftermarket performance of the IPO.

If the amount of the initial returns is attributable to equilibrium phenomena, then one would expect there to be no relation between initial returns and aftermarket performance. Theory (Rock, 1985) suggests that the amount of initial returns should be affected by the risk associated with the uncertainty of the true value of the IPO. This risk is a result of the asymmetric information present in pricing companies which first go public and the uncertainty regarding the IPO's true value, which is consistent with having never traded. This type of risk is different from the risk associated with aftermarket trading (i.e. beta type risk). However a negative relation between initial returns and aftermarket performance may indicate speculative excesses in IPO pricing on the first day of trading.

4C1. Formulations for aftermarket market-adjusted and risk-adjusted one-year returns

Multivariate regression models are used to evaluate the impact of initial returns on market-adjusted and industry-adjusted aftermarket one-year returns. The formulations for the after-market returns, which are computed for each IPO, are as follows:

6a) S&P market-adjusted one-year return = Raw one-year return – S&P one-year return.

6b) *Technology industry-adjusted one-year return = Raw one-year return – Technology industry matched portfolio one-year return*

4C2. Regression models

The control variable used in the regression models is TECH_DUM, a dummy variable which takes the value of one, if the IPO is in a technology related industry, and zero otherwise. See Table 2, Panel A for industry descriptions and SIC codes for the firms classified as technology related. The technology specification as a control variable is necessary because of the high prevalence of these types of IPOs during this period and the potential impact of their frequency on overall returns of IPOs. Of the 376 IPOs in the sample, 120 were technology related (Table 1, Panel C).

Previous studies (Carter and Manaster 1990; Megginson and Weiss 1991; Michaely and Shaw 1994; and Carter, et al. 1998) have shown that industry may affect initial returns of IPOs. For the study period overall, the average initial return of tech IPOs was 97.9% versus 22.2% for non-tech IPOs. To control for the affects this could have on the regression analysis, the TECH_DUM variable is used in Model 1. Two regression models are specified as follows

Model 1: S&P market-adjusted one-year return = $B_0 + B_1$ Market-adjusted initial return + B_3 TECH_DUM

Model 2: S&P Market-adjusted one-year return = $B_0 + B_1$ Market-adjusted initial return

The TECH_DUM variable is included in only Model 1, to determine the marginal impact of its inclusion in the model. If the variable is significant in Model 1, this might indicate that the relationship between initial returns and aftermarket performance is fueled by the prevalence of a large number technology IPOs and their excessive initial returns, during this period.

5. Results

5A. Aftermarket performance of IPOs

The results of the study tend to support the presence of speculative excesses in aftermarket IPO pricing. Table 3 presents the average S&P market-adjusted underperformance for the non-tech IPOs and the industry-matched underperformance for the tech IPOs. The performance measures for both the tech and non-tech IPOs outperformed the *Raw one-year returns* for both periods and overall. However the underperformance in a pair wise mean difference test is only significant during the period, January 1, 1999 through June 30, 2000, for tech IPOs. The underperformance is also significant, overall, for this period.

5B. Imputed initial returns of IPOs

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Table 4, Panel A presents the computed average implied initial returns. The average implied initial returns appear low, during the period January 1, 1997 through December 31, 1998. Further the average implied initial return is negative for non-tech issues during this period. This could possibly indicate some overpricing in the primary market, for these IPOs. However the average implied initial returns for the period January 1, 1999 through June 30, 2000 appear more reasonable. The higher average initial returns for the tech IPOs is as expected since these IPOs may be more difficult to value in the primary market.

Table 4, Panel A also reports the average excess actual initial returns over implied initial returns. If speculative excesses in first day IPO pricing are present then one would expect the excess actual initial return over the implied initial return (Table 4) to be comparable to the one-year aftermarket underperformance (Table 3). The average excess initial returns for both the tech and non-tech IPOs, and overall appears greater than the average underperformances. However they are actually comparable. The low underperformance in combination with high actual initial returns is a result of geometric compounding which occurs. For example suppose an IPO has an offer price of \$20, a first day trading price of \$38 and a post one-year price of \$34.20. The initial return for the IPO is 90%. The after-market return is -10%. The return from offer would be 71%. If the expected aftermarket return was 45%, then the imputed return would be 18%. In this scenario the underperformance of the IPO is 55% and the excess of the actual over the implied initial return is 72%. Because of compounding the excess actual initial returns being greater than the one-year aftermarket performance is consistent with overpricing of IPOs on the first trading day.

Table 4, Panel B reports the standard deviation of actual initial returns. It appears that higher implied initial returns are associated with higher standard deviations of actual returns. Although the higher standard deviations of the latter period are more likely associated with the more extensive aftermarket overpricing prevalent during this time period.

5C. Regression of initial returns on aftermarket returns

Table 5, Panels A, B, and C present the regressions of the actual initial returns on market (for non-tech IPOs) and industry (for tech IPOs) adjusted one-year returns. The coefficients on the market-adjusted initial returns are negative and significant in both of the regressions, for the period, January 1, 1999 through June 30, 2000. These results indicate that the higher the actual initial return for an IPO the lower the aftermarket adjusted returns during this period. These results may indicate the presence of speculative excesses in first day trading of IPOs.

Another observation, for the latter period, is that coefficients on the market-adjusted initial returns are less significant when model 2 is used. Model 2 includes the TECH_DUM variable. It can also be observed that coefficient on the TECH_DUM variable is more significant than the initial return coefficient in Model 2. These results may indicate that the technology related IPOs may, in large part, be responsible for the negative relationship between initial returns and aftermarket returns. A further implication of these results is that first trading day overpricing and aftermarket underperformance may be more prevalent for the technology IPOs during the period January 1, 1999 through June 30, 2000.

These results suggest that during the second period, IPOs which exhibited higher initial returns, also exhibited lower aftermarket returns. The inclusion of both periods in the model (Panel C) does not diminish the results. This indicates that over the study period January 1, 1997 through June 30, 2000, a negative relation exists between actual initial returns and aftermarket performance. No significant findings were noted for the period, January 1, 1997 through December 31, 1998, by itself.

6. Conclusion

These results have important implications for investors who wish to purchase IPOs in aftermarket trading. These results indicate the presence of speculative excesses in first day trading prices, during the period, January 1, 1999 through June 30, 2000. A further finding is that these speculative excesses may be more prevalent for the technology IPOs.

One major difference between the findings of this study and Ritter's (1984) study is that this study finds that all IPOs have higher underpricing during the hot issues period rather than a specific industry. However the implications of the current study are similar to Ritter's (1984) study in that overpricing of IPOs on the first trading day may be related to investor behavioral issues.

Three findings of this study tend to support the speculative bubble hypothesis and the overpricing of IPOs on the first trading dates during the period January 1, 1999 through June 30, 2000. First significant underperformance is noted in aftermarket trading during this period. Second, the implied initial returns appear reasonable. Excess actual initial returns over the computed implied initial returns are comparable to the one-year aftermarket underperformance, on average. And, third, a negative and significant relation is noted between the actual initial returns and the aftermarket performance of the IPOs.

The *ex post* formulation may be limited in its use for computing implied initial returns. However, the results of this study are strengthened by two factors. First, one would expect that the aftermarket performance of the

IPOs on average should be comparable to some measurement standard. Second, the trading prices of the IPOs should tend to approach their intrinsic value over time.

**Speculative
Excesses in
Initial Pricing
of IPOs**

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Table 1 Sample Description					
Panel A Sample development					
	1997	1998	1999	2000	1997-2000
Total	109	68	133	98	408
Merged	-7	-3	-5	-8	-23
Private, not trading	-4	-1	-2	-2	-9
Sample	98	64	126	88	376
Panel B Inactive companies					
Bankruptcies	3	2	0	0	5
Bankruptcy proceeding	3	9	10	5	27
Liquidation	1	0	0	0	1
Actively trading	91	53	116	83	343
Total in sample	98	64	126	88	376
Panel C Technology-related IPOs					
Technology related IPOs	11	11	53	45	120
Non-tech IPOs	87	53	73	43	256
Total in sample	98	64	126	88	376

Table 2 Technology-related IPOs

Panel A Technology-related industry descriptions and SIC codes	
Industry description	SIC code
Computer hardware, semiconductors, storage devices, and peripherals	3559, 3570, 3572, 3577, 3674
Computer networking, software, and services	7370, 7372, 7374, 7389
Communications equipment	3576, 3663

Panel B Portfolio of technology related firms		
Company, ticker symbol	Industry description	SIC code
Cannon Inc.	Computer peripherals	3577
Cisco Systems, CSCO	Communication equipment	3576
Convergys Corp,	Computer networking	7389
Dell Inc., DELL	Computer hardware	3571
First Data Corp., FDC	Computer services	7374
Hewlett-Packard Co.,	Computer peripherals	3570
IBM Corp., IBM	Computer hardware	3571
Microsoft Corp.,	Computer software	7372
Network Appliance Inc.	Computer networking equipment	3572
Nokia Corp., NOK	Communication equipment	3663
Novell Inc. NOVL	Computer networking	7389
Novell Inc. NOVL	Semiconductors	7372
On Technology Corp.,	Computer software	7372
Oracle Corp.,	Storage devices	3572
Sandisk Corp.,	Storage devices	3572
Seagate Technology,	Storage devices	3674
ST Microelectronics,	Semiconductors	3674
Storage Technology	Storage devices	3572
Texas Instruments,	Semiconductors	3674
Veritas Software Co.	Computer software	7372
Yahoo Inc.	Computer services/internet	7370

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Table 3 Aftermarket underperformance						
	Jan 1997-Dec 1998		Jan 1999-June 2000			
	Non-tech	Tech	Overall	Non-tech	Tech	Overall
Number IPOs	143	21	164	113	99	212
Average raw one-year return	12.0%	54.7%	17.8%	-10.6%	-29.9%	-19.7%
Average S&P one-year return	21.4%			0.3%		
Average technology industry matched portfolio one-year return		87.8%			16.9%	
Average underperformance (B)	9.4%	33.1%	12.6%	10.9%	46.8%	27.9%
t-values pair wise difference in mean	1.265	1.531	1.789	1.791	3.098 ^a	3.446 ^a

Table 4 Implied Initial Returns

Panel A Computation of implied initial returns and differences between actual and implied initial returns

	Jan 1997-Dec 1998		Jan 1999-June 2000			
	Non-tech	Tech	Overall	Non-tech	Tech	Overall
Number IPOS	143	21	113	113	99	120
Raw one-year return from offer	19.2%	104.6%	30.8%	12.0%	45.4%	27.7%
Average S&P one-year return	21.4%			0.3%		
Average technology industry matched portfolio one-year return		87.8%			16.9%	29.9%
Average Implied initial return	-2.0%	6.4%	-0.8%	9.6%	22.3%	19.4%
Average actual market adjusted initial return	7.2%	22.0%	9.2%	41.3%	115.0%	76.0%
Average difference between actual and implied initial returns, average excess initial return	9.2%	15.5%	10.0%	31.7%	92.7%	56.6%

Panel B Standard deviation of actual initial returns

Standard deviation of actual market-adjusted initial returns	21.2%	24.1%	23.1%	80.5%	138.5%	131.0%
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Table 5 Multiple Regression of initial returns on estimated one-year returns

Models
1) Model 1: S&P market-adjusted one-year return = $B_0 + B_1$ Market-adjusted initial return
2) Model 1: S&P market-adjusted one-year return = $B_0 + B_1$ Market-adjusted initial return + B_2 TECH_DUM

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Panel A Jan 1, 1997 to Dec 31, 1998		
	Model 1	Model 2
Constant Coefficient (<i>t</i> -value)	-0.141 (-1.850)	-0.113 (-1.421)
Market-adjusted initial re- turn (<i>t</i> -value)	1.167 (0.525)	0.266 (0.814)
TECH_DUM (<i>t</i> -value)		-0.278 (-1.316)
R Square	0.002	.106
F Value	0.275	9.422 ^a
significance	0.601	0.000 ^a

Panel B Jan 1, 1999 to June 30, 2000		
	Model 1	Model 2
Constant Coefficient (<i>t</i> -value)	-0.224 (-3.426 ^a)	-0.064 (-0.846)
Market-adjusted initial return (<i>t</i> -value)	-0.169 (-3.586 ^a)	-0.111 (-2.323 ^b)
TECH_DUM (<i>t</i> -value)		-0.437 (-3.891 ^a)
R Square	.059	.125
F Value	12.860 ^a	14.444 ^a
significance	0.000 ^a	0.000 ^a

Panel C Jan 1, 1997 to June 30, 2000		
	Model 1	Model 2
Constant Coefficient (<i>t</i> -value)	-0.168 (-3.456 ^a)	-0.076 (-1.429)
Market-adjusted initial return (<i>t</i> -value)	-0.181 (3.922 ^a)	-0.111 (-2.273 ^b)
TECH_DUM (<i>t</i> -value)		-0.389 (-3.931 ^a)
R Square	0.040	.079
F Value	15.378 ^a	15.721 ^a
significance	0.000 ^a	0.000 ^a

a, b, and c stand for significant at 0.01, 0.025, and 0.05.

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