Financial Management

Underwriter Quality and Long-Run IPO Performance

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We analyze the relationship between the quality of underwriters and the long-run performance of initial public offerings (IPOs) in light of underwriter marketing, certification and screening, and information production. We find that higher underwriter quality (measured by the number of managing underwriters, underwriter reputation, and absolute price adjustment) predicts better long-run performance, even when returns are value weighted. We compare underwriter quality measures and find that the effects of the number of managing underwriters and underwriter reputation are mutually complementary and are especially strong among IPOs with high uncertainty, while absolute price adjustment, which is more likely to be associated with information production than marketing or certification/screening, loses significance. Our findings are consistent with the marketing and certification and screening roles of investment banks but lend little support for the information production role of underwriters.

There is much literature devoted to the long-run stock performance of initial public offerings (IPOs). Ritter (1991) and Loughran and Ritter (1995) are among the first to document the long-run underperformance of IPOs. Brav, Geczy, and Gompers (2000) find that in a sample of IPOs from 1975 to 1992, the underperformance described in earlier studies is concentrated among small firms with low book-to-market ratios and there is no general underperformance of IPO firms. Other studies document additional patterns in long-run performance (Purnanandam and Swaminathan, 2004; Chan et al., 2008). Despite these and other studies on IPOs, the sources of the difference in long-run performance remain unresolved (see Ritter and Welch, 2002, for a broader survey). In this paper, we relate the long-run performance of IPOs to the quality of the underwriters. Specifically, we evaluate the merits of three underwriter functions in explaining the difference in long-run IPO performance: 1) marketing, 2) certification and screening, and 3) information production.

First, investment banks provide marketing services including promoting the IPO to stimulate investor interest in the stock and providing aftermarket price support and analyst research coverage of the stock. These marketing efforts can create investor demand and, as such, increase the aftermarket stock price of the IPO. For instance, underwriter marketing will increase investor awareness and enhance the investor base of the IPO, resulting in better risk sharing and liquidity

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and a higher equilibrium market price after the offer (Merton, 1987; Booth and Chua, 1996; Zhang, 2004; Cook, Kieschnick, and Van Ness, 2006). Also, underwriters' efforts in price support, such as market making, price stabilization, and penalty bids, will increase the aftermarket price of the IPO (Aggarwal, 2000; Ellis, Michaely, and O'Hara, 2000). In addition, underwriters almost always provide analyst coverage after the offer (Corwin and Schultz, 2005; Bradley, Jordan, and Ritter, 2008), and more analyst coverage is associated with high investor demand (Ritter, 2003; James and Karceski, 2006; Das, Guo, and Zhang, 2006). However, since marketing can increase both the short-run and long-run aftermarket prices, the effect of marketing on long-run performance depends on the relative strength of the short-run and long-run boost in market price.

Additionally, investment banks screen IPO candidates and certify firm value (Booth and Smith, 1986; Carter and Manaster, 1990; Michaely and Shaw, 1994). Under this framework, if investors fail to understand the certification or screening role of underwriters, they would overvalue IPOs brought to market by low-quality underwriters and undervalue IPOs screened by high-quality underwriters, leading to a positive correlation between underwriter quality and long-run IPO performance.

Moreover, investment banks produce information during the bookbuilding period. Under this framework, IPOs tend to be overvalued by the most optimistic investors (Miller, 1977), and the overvaluation should be higher when investors lack information about the firm (Daniel, Hirshleifer, and Subrahmanyam, 1998; Hirshleifer, 2001). This suggests that information production by the underwriters to reveal the true intrinsic value of a firm can reduce behavioral biases associated with IPO overvaluation. If information production reduces the heterogeneity of investor opinion, it should lead to a more elastic and less negatively sloped demand curve at the time of the offer. Furthermore, depending on whether the information is good or bad, the demand curve will respectively shift up or down. This approach suggests that high-information-production IPOs should be fairly priced, while low-information-production IPOs should have worse long-run performance as the initial IPO overvaluation is corrected.

In this paper, we test whether the quality of underwriters influences the long-run performance of IPOs. In addition, since the potential effect of underwriters should be especially strong when firm uncertainty is high under all three frameworks (see Section I for detailed discussion), we test whether underwriter quality has a greater effect on long-run performance when uncertainty about the IPO is higher. The marketing, certification/screening, and information production hypotheses are all tested jointly with the auxiliary hypothesis of market inefficiency that investors do not understand the information content of underwriter quality.

Based on several papers on underwriter marketing, certification/screening, and information production in new issues (Booth and Smith, 1986; Carter and Manaster, 1990; Ellis et al., 2000; Corwin and Schultz, 2005; Bradley et al., 2008; Huang and Zhang, 2009; Lowry, Officer, and Schwert, 2010), we use three measures for underwriter quality in this paper: 1) the number of managing underwriters, 2) underwriter rating, and 3) absolute price adjustment. Our third proxy for underwriter quality (absolute price adjustment), which is less likely to be associated with marketing and certification/screening and more likely to be associated with information production, is used to distinguish the marketing and certification/screening hypotheses from the information production hypothesis. In addition, we use the residual return volatility based on the market model as our measure of firm-specific uncertainty following Wurgler and Zhuravskaya (2002), Huang and Zhang (2009), and Gao and Ritter (2010). The residual volatility is measured in the one-month period after the IPO. We measure long-run returns excluding the first partial month after the IPO and the subsequent calendar month to avoid a possible endogeneity between long-run returns and our uncertainty proxy.

We study the long-run stock performance of IPOs from 1980 to 2006. Since there is evidence that underwriters may have a change in their objective functions in the late 1990s (Loughran and

Ritter, 2004), and the Fama and French (1993) risk adjustment methodology for long-run returns tests is unreliable if IPOs of the 1999-2000 "bubble period" are included (Ritter and Welch, 2002), we test the bubble period separately. We study a sample of 7,407 IPOs from 1980 to 2006 including 6,622 IPOs in the nonbubble period and 785 in the bubble period. We present results mainly for the nonbubble period, followed by a discussion of the bubble period evidence.

We first test whether higher underwriter quality predicts better long-run performance. When we sort the (nonbubble period) IPOs yearly into three portfolios by our underwriter quality proxies, we find that IPOs with higher underwriter quality outperform IPOs with lower underwriter quality on an equal-weighted style-adjusted basis (using size and book-to-market portfolios as the benchmark) by 17% to 34% over a three-year period depending on the proxy. Using value-weighed returns yields an even larger return differential, though the statistical significance for the return differential is lower than with equal-weighted returns.

We also form nine (3×3) bivariate portfolios sorted by underwriter quality and uncertainty. We find that the impact of underwriter quality is much stronger among IPOs with high uncertainty (residual volatility). For example, consider the zero investment hedge strategy that goes long on the high managing underwriter portfolio and short on the low managing underwriter portfolio. This hedge strategy has a three-year mean value-weighted style-adjusted return of 82% among high-volatility firms compared to 27% among low-volatility firms. The hedge strategies based on underwriter rating or absolute price adjustment yield similar findings. These results support the idea that the effect of underwriter quality on long-run performance is primarily concentrated among high uncertainty IPOs.

Our results are robust to various risk adjustment procedures. In the cross-sectional regressions, we use the factor-adjusted long-run return, the intercept from the regression of long-run returns on the Lyandres, Sun, and Zhang (2008) four-factor model (LSZ, henceforth), as the dependent variable and regress it on underwriter quality proxies (number of managing underwriters or underwriter rating or absolute price adjustment), the uncertainty proxy (residual volatility), and other controls. We find that the number of managing underwriters and underwriter rating positively affect long-run performance, even when we include all three proxies in the same regression. We further split our sample into high- and low-volatility IPOs and find that both the number of managing underwriters and underwriter rating have larger and more significant coefficients among high-volatility IPOs than among low-volatility IPOs. Furthermore, the finding that the number of managing underwriters and underwriting rating positively affect long-run performance is robust to calendar-time regressions for both equal- and value-weighted portfolios. That the effect of these proxies on long-run returns is robust to value weighting suggests that this effect is not driven by small, low-quality IPOs.

With respect to the underwriter marketing hypothesis, our results indicate that the net effect of marketing boosts long-run IPO returns. In other words, underwriter marketing boosts the long-run price more than the short-run price. In our cross-sectional regression, we control for the short-run effect by including the first-day return, and find that the first-day return has a positive effect among high-volatility IPOs and an insignificant effect among low-volatility IPOs. This indicates that a short-run marketing effect (outside of the bubble period) does not hurt long-run IPO performance, and when uncertainty is high, it helps long-run performance. This finding is consistent with the idea that marketing is particularly important for the success of an IPO with high uncertainty and the initial price support helps its long-run performance. The empirical patterns we observe are also consistent with the underwriter certification/screening hypothesis, if one assumes that high-quality investment banks have the ability to screen IPO candidates.

Empirically, we distinguish the marketing and certification/screening hypotheses from the information production hypothesis in two ways. First, the information production hypothesis predicts zero abnormal performance for IPOs with high underwriter quality and negative abnormal

performance for IPOs with low underwriter quality, assuming that the market does not correctly interpret the implications of low underwriter quality. The finding that IPOs with high underwriter quality earn substantial positive abnormal returns is inconsistent with the information production hypothesis. Second, our third measure of underwriter quality, absolute offer price adjustment in the bookbuilding period, is less correlated with the marketing efforts and certification/screening of the underwriters and more correlated with information production. We run a horse race between this purer measure of information production and the number of managing underwriters and underwriter rating and find that the information production effect as measured by absolute price adjustment is insignificantly related to long-run performance after factor-adjusting returns or controlling for the number of managing underwriters or underwriter rating. Therefore, the evidence lends little support to the information production hypothesis in explaining the positive relationship between underwriter quality and long-run performance.

In the Internet bubble period (1999-2000), our underwriter quality proxies appear to have an inverse effect on long-run postoffer returns. Based on the portfolio sorts, our proxies do not lead to better long-run IPO performance; if anything, IPOs with greater underwriter quality have lower three-year returns. These findings indicate a shift in the role of underwriters during the bubble period in the spirit of Loughran and Ritter (2004).

Our paper makes several contributions to the literature. First, we are the first to document that the number of managing underwriters predicts long-run IPO performance even after controlling for measures found to be important in the prior literature, including underwriter rating. Second, we are the first to compare the merits of the marketing, certification/screening, and information production hypotheses of long-run performance, and to provide methods to differentiate information production from underwriter marketing and certification/screening, partly with the use of the absolute price adjustment measure. Finally, even though the prior literature relates underwriter rating to long-run IPO returns (Michaely and Shaw, 1994; Carter, Dark, and Singh, 1998; Chan et al., 2008), we find that this relationship is economically more important among IPOs with high uncertainty as measured by residual volatility.

The remainder of the paper is structured as follows: Section I reviews the literature and develops our hypotheses. Section II describes the data and summary statistics of our IPO sample. Section III reports the long-run compounded abnormal returns in both univariate and bivariate sorts. Section IV presents cross-section and calendar-time regression results. Section V discusses the interpretations of our results, while Section VI provides our conclusions.

I. Literature Review and Hypothesis Development

The empirical findings from this paper can be interpreted under three frameworks. We first discuss the marketing hypothesis, followed by a discussion of the certification/screening hypothesis, and the information production hypothesis. In all these frameworks, we assume that investors do not understand the information content of underwriter quality, so that there can be a relationship between underwriter quality and long-run IPO performance. Finally, we describe the underwriter quality and volatility proxies used in our empirical tests.

A. The Marketing Hypothesis

We follow Huang and Zhang (2009) in defining the marketing of a security "as actions that influence the demand and hence affect the price of the security without necessarily discovering any private information on the intrinsic value of the security." The marketing efforts include

any promotional activities in the road shows prior to the offer, the aftermarket price support, and analyst coverage. Marketing may enhance the demand for the IPO, thereby increasing the aftermarket stock price and improving long-run performance for several reasons.

First, underwriter marketing will increase investor awareness and enhance the investor base of the IPO, resulting in better risk sharing and liquidity and a higher equilibrium market price after the offer (Merton, 1987; Booth and Chua, 1996). Huang and Zhang (2009) demonstrate that marketing, as proxied by the number of managing underwriters, affects the demand of seasoned equity issues. There is also evidence that investors are more likely to buy attention-grabbing, highly visible stocks (Frieder and Subrahmanyam, 2005; Cook et al., 2006; Tetlock, 2007; Barber and Odean, 2008). Additionally, underwriters' efforts in price support, such as market making, price stabilization, and penalty bids, will increase the aftermarket price of the IPO (Aggarwal, 2000; Ellis et al., 2000). Zhang (2004) argues that the total demand to hold an IPO stock is larger when more shares are allocated initially. This argument may have its root in investors' behavioral bias to keep holding a stock once they already own it (Kahneman, Knetsch, and Thaler, 1990). Moreover, theory and empirical evidence suggest that underwriters often provide analyst coverage after the offer (Chemmanur, 1993; Corwin and Schultz, 2005; Bradley et al., 2008), and more analyst coverage is associated with high investor demand (Chung and Jo, 1996; Ritter, 2003; James and Karceski, 2006; Das et al., 2006; Degeorge, Derrien, and Womack, 2007).

The calculation of long-run returns involves both the starting and ending prices. Since marketing can boost both the starting price and ending price of the return period, the net effect of marketing depends on the relative strength of the effect on the starting versus the ending prices. For example, Chemmanur and Krishnan (2009) posit that a boost in offer time demand may increase the short-run price and decrease the long-run performance of IPOs. Therefore, the marketing hypothesis allows for both a positive and negative effect of marketing on long-run IPO performance, depending on whether the long- or short-run price effect of marketing is stronger.

Furthermore, the extent of the upward shift of the demand curve should depend on the degree of the uncertainty of the IPO. There are theoretical arguments as to why stocks with high arbitrage risk (i.e., high uncertainty) should have a less elastic, more negatively sloped demand curve (Wurgler and Zhuravaskaya, 2002). Huang and Zhang (2009) and Gao and Ritter (2010) demonstrate that marketing affects the demand of new equity issues, especially for stocks with high uncertainty. It is therefore reasonable to expect that marketing has a greater price effect on stocks with high uncertainty.

Two recent studies are particularly related to this paper. Das et al. (2006) examine the ability of analysts to forecast future performance. In a sample of IPOs from 1986 to 2000, they find that IPO firms with high residual analyst coverage earn better future returns than IPOs with low residual analyst coverage. The authors use residual coverage as they wish to capture the initiated coverage that is unpredictable (predicted analyst coverage is determined using the number of book managers and comanagers and underwriter rating among other variables). Since aftermarket analyst coverage is an important form of marketing service of the underwriters, and residual analyst coverage may be related to information production by the underwriters, this finding is potentially consistent with the marketing and information production roles of underwriters, even though the authors do not make this link. Chan et al. (2008) examine the joint relation of discretionary accruals, underwriter reputation, and venture capital (VC) backing with the long-run performance of IPOs. In a sample of IPOs from 1980 to 2000, they find greater differentiating power when simultaneously examining these three variables. They report that IPOs with high discretionary accruals, low reputation lead underwriters, and no VC backing ("loser" IPOs) significantly underperform the benchmark in the long run.

Our study is different from these papers in several ways. First, neither paper analyzes the relationship between underwriter characteristics and long-run IPO performance in light of the marketing, certification/screening, or information production hypotheses (discussed later), while we do. Additionally, neither paper uses the number of managing underwriters as a predictor of long-run performance. Finally, we make the incremental prediction that the correlation between underwriter quality and long-run returns is strongest among IPOs with high uncertainty, as measured by residual volatility.

B. The Certification/Screening Hypothesis

One method of reducing the informational asymmetry in the IPO market is to hire the services of an investment bank. As discussed in Booth and Smith (1986), certification is an important function performed by underwriters. By agreeing to underwrite an offering, high-quality investment banks "certify" the quality of the issue. If investors fail to understand the certification role of underwriters, investors will overpay (both at the offer price and in the immediate aftermarket) for IPOs lacking in certification from a high-quality underwriter, thereby causing the future underperformance of these IPOs. Conversely, similar to underwriter marketing, certification by a high-quality investment bank can boost the demand for the issue.

A related underwriter function is screening IPO candidates and identifying firm values. For example, Michaely and Shaw (1994) find that underwriter quality lessens the need to underprice by reducing the information asymmetry between uninformed investors and informed institutional investors. Hoberg (2007), in a duopoly model in which underwriters benefit from underpricing, makes the opposite prediction. In the model of Carter and Manaster (1990), the value of the issuing firm is private information to the firm, and the ability of underwriters to estimate the values of the firms and communicate this information via the issue prospectus varies with their skill endowment. Prestigious underwriters are adept at identifying the dispersion of issuing firms' secondary market value (i.e., screening). Carter et al. (1998) suggest that underwriters' screening ability may be responsible for the superior performance of IPOs brought to market by high-reputation underwriters. Therefore, under this framework, high-quality underwriters (and the analysts associated with them) screen and certify IPOs with a good business model, leading to a positive correlation between underwriter quality and long-run abnormal returns (again, if investors do not interpret the information content of underwriter quality).

The effect of certification/screening on investor demand should depend on the elasticity of the demand curve (which, as discussed above, depends on the degree of the uncertainty of the IPO). Therefore, certification/screening should have a greater price effect on stocks with high arbitrage risk or uncertainty. Another reason that the screening effect should be strong among high-uncertainty stocks is that these stocks are hard to value, and the screening ability should be most valuable for those stocks.

C. The Information Production Hypothesis

Miller (1977) predicts that in the presence of short-sales constraints, the price of a firm tends to reflect the valuations of the most optimistic investors and thus tends to be upward biased. Therefore, greater divergence in investor beliefs about the firm's true value will lead to short-run overvaluation and long-run underperformance. A related explanation of long-run underperformance is provided by the theory of Daniel et al. (1998), who attribute the initial overvaluation to investors' behavioral biases. Daniel et al. (1998) propose that overreaction is due to investor overconfidence about the precision of their private information, and when this overvaluation is subsequently corrected, the overvalued securities experience poor long-run

performance.[1] Hirshleifer (2001) further notes that individuals tend to be more overconfident when feedback on their information or decisions is deferred or inconclusive. When information about a firm is sparse, or there is a lack of accurate feedback about a firm's fundamentals, investors are more prone to biases in valuing securities. While the models just mentioned are general, they also apply to IPOs. Specifically, we can expect that the information produced by underwriters to reveal the true intrinsic value of a firm should mitigate investor behavioral biases and reduce IPO overvaluation.

In the framework of Miller (1977) and Daniel et al. (1998), the role of information production is to provide timely feedback and reduce investor behavioral biases (i.e., overreaction to private information) and IPO overvaluation. Psychological studies suggest that biases such as overconfidence will be more severe in activities for which feedback is deferred and highly uncertain (Einhorn, 1980). Since private information is more likely to have an impact on investors when the IPO is difficult to value (i.e., when there is more uncertainty about the IPO), we can expect that the role of preoffer information production in reducing overvaluation is most important when uncertainty is highest.

One can think of information production as reducing the heterogeneity of investor opinion, leading to a more elastic and less negatively sloped demand curve at the time of the offer. The revelation of valuation relevant information may also shift the demand curve up or down depending on the information. The information production approach suggests that high-information-production IPOs should be fairly priced, while low-information-production IPOs should be overpriced and have negative abnormal returns.

D. Proxies for Underwriter Quality and Uncertainty

We use three proxies for underwriter quality: 1) the number of managing underwriters, 2) underwriter reputation, and 3) absolute price adjustment. All three measures should be positively associated with the level of underwriter marketing, certification/screening, and information production. But the third proxy, absolute price adjustment, should be more of a measure of information production than marketing and certification.

Our first measure of underwriter quality is the number of managing underwriters. This measure is used by Huang and Zhang (2009) as a proxy for marketing activity in their study of the price discount of seasoned equity offerings (SEOs). Corwin and Schultz (2005) find that the number of managing underwriters is positively related to aftermarket analyst coverage, although Bradley et al. (2008) find that the effect of managing underwriters on analyst coverage is short lived. Our second measure, the lead underwriters' reputation, is also a proxy for marketing efforts. Hanley, Kumar, and Seguin (1993) report that the lead underwriter engages in price stabilization. Ellis et al. (2000) find that the lead underwriter always becomes the market maker, becomes the most active dealer, and engages in stabilization activity for less successful IPOs. Bradley et al. (2008) determine that the number of brokers following an IPO is positively related to underwriter reputation, and there is a tight correlation between the number of managing underwriters and analysts following an IPO at the end of the quiet period.

[1] Daniel et al. (1998) also allow for the case where investors overreact to pessimistic private information, leading to initial undervaluation and subsequent stock outperformance. However, their model predicts long-run underperformance after new issues (which include IPOs). Furthermore, in the IPO market, initial market prices reflect optimistic valuations because short sales are not possible before the offer, and pessimistic views are either not reflected at the offering time or tend to be dominated by optimistic views shortly after the offer (Miller, 1977; Purnanandam and Swaminathan, 2004). Therefore, we focus on the case of initial investor overvaluation.

The number of managing underwriters and underwriter reputation should also indicate the level of certification and screening. If reputational capital is more valuable for prestigious investment banks, then the level of certification for an IPO should be positively correlated with underwriter reputation. A related function of investment banks is screening (Carter and Manaster, 1990; Michaely and Shaw, 1994). Prestigious underwriters may be better at screening IPO candidates as their analysts are unwilling to drop coverage of a larger company that has more institutional trading in order to initiate coverage on an IPO unless the analyst is of the opinion that the IPO company has a good business model. Similarly, if fewer analysts are convinced regarding the merits of an IPO company, the company should have greater difficulty adding comanagers whose main role is to provide analyst coverage.

Furthermore, the number of managing underwriters and underwriter rating may also capture the information produced during IPO bookbuilding. The partial adjustment of the offer price (Hanley, 1993) is consistent with the Benveniste and Spindt (1989) model, which predicts that the IPO price update will not fully reflect the private information learned by the underwriter during the bookbuilding process.[2] Corwin and Schultz (2005) find that offer prices are more likely to be revised in response to information when there are many syndicate members, especially when there are many comanagers. Furthermore, the size of offer price revisions also increases with syndicate size, particularly if more highly ranked comanagers are included. In addition, a positive relationship between underwriter reputation and the number of analysts following a stock, as documented by Bradley et al. (2008), may indicate that underwriter reputation is related to information production.

To help distinguish the marketing and certification/screening hypotheses from the information production hypothesis, we employ a third proxy for underwriter quality that is less likely to be associated with marketing and certification/screening and more likely to be associated with information production. Lowry et al. (2010) argue that the absolute price adjustment reflects the amount of learning that occurs during the registration period. Consistent with this argument, Wang and Yung (2009) find evidence on differences in underwriter information aggregation by noting that the variability of price adjustment increases monotonically with bank reputation. There is reason to believe that the absolute price adjustment is more a measure of information production than marketing and certification/screening. The prior literature finds (and we confirm) that raw price adjustment has no significant association with long-run performance. Therefore, a positive correlation between absolute price adjustment and long-run returns is consistent with the interpretation that information production, rather than some other roles for underwriters such as marketing or certification/screening, affects long-run performance. In particular, when raw price adjustment is negative, it is unreasonable to envision absolute price adjustment to represent underwriters promoting the issuing firm's IPO. Moreover, in our sample, (the natural logarithm of) the number of managing underwriters is highly correlated with underwriter rating (with a correlation coefficient of 0.51), but both variables have a relatively low correlation (0.21 and 0.18, respectively) with absolute price adjustment.[3] Therefore, we regard absolute price adjustment as a purer measure of information production compared to the number of managing underwriters and underwriter reputation.

[2] However, Ince (2008) finds that when offer prices are adjusted upward, only a small portion of publicly available information is reflected in the offer price adjustment, significantly lower than the portion for private information. This result is inconsistent with the prediction of the information revelation theory.

[3] After we adjust the logarithm of the number of managing underwriters by the same calendar month's average value, it has a correlation of 0.53 with underwriter reputation and a correlation of 0.10 with absolute price adjustment.

Finally, we use a measure of uncertainty in addition to our measures of underwriter quality. Following the prior literature (Wurgler and Zhuravaskaya, 2002; Boehme, Danielsen, and Sorescu, 2006; Boehme et al., 2009; Huang and Zhang, 2009; Gao and Ritter, 2010), we use the residual daily return volatility to measure uncertainty. It is based on the market model measured in the one-month period after the IPO because there are no trading records prior to the offer. We use residual volatility as our uncertainty measure to extract the firm-specific uncertainty that is relevant to the demand schedule of the stock and also to make this measure more comparable across time periods.[4]

II. Data and Summary Statistics

A. Data

We obtain offering data on the IPOs of ordinary common shares as well as book value of equity after the offer from 1980 to 2006 from the Thomson-Reuters New Issues database, the Securities Data Company (SDC) database. We begin our sample in 1980 as many variables have poor coverage prior to this date, and we end it in 2006 in order to allow for a three-year period to calculate long-run performance.[5] We eliminate IPOs that are not covered by the Center for Research in Security Prices (CRSP) within the first 30 days of the offer, leaving 9,947 observations. Additionally, we eliminate unit offerings, closed-end funds, American Depositary Receipts (ADRs), real estate investment trusts (REITs), shares of beneficial interest (SBIs), and IPOs with an offer price of less than $5, leaving 7,407 IPOs in the sample.[6] Finally, since we focus on the effect of underwriter marketing on long-run returns, and Ritter and Welch (2002) document that standard long-run return risk adjustment techniques can produce very odd results for Internet bubble IPOs, we examine the bubble period (January 1999-December 2000) observations separately. The resulting "nonbubble" sample includes 6,622 IPOs, while the final "bubble" sample contains 785 IPOs.

We obtain the company founding date from the Field-Ritter data set, as used in Field and Karpoff (2002) and Loughran and Ritter (2004), as well as the Carter and Manaster (1990) underwriter reputation rankings updated by Jay Ritter from his website.[7]

Share prices, returns, share codes, and shares outstanding are obtained from CRSP. Size and book-to-market portfolios, Fama and French (1993) factors, and the Carhart (1997) momentum factor are obtained from Kenneth French's website.[8] Finally, we obtain the Lyandres et al. (2008) investment factor from the authors.

B. Summary Statistics

Table I reports summary statistics for the variables used throughout this paper. Panel A presents firm and offer characteristics. There are, on average, 2.29 managing underwriters (NMGR) in

[4] In unreported tests, we also use raw volatility and residual volatility using the Fama and French (1993) three factors as controls (measured in the one-month period after the offer) as measures of uncertainty. Results remain qualitatively similar.

[5] Initially, we used two- and four-year horizons that also yielded significant results in support of our hypotheses. For brevity, we report three-year results throughout this paper.

[6] We require that the issues are of common shares by only retaining CRSP share codes 10 and 11 of domestic companies. Further, we make adjustments where appropriate from Jay Ritter's list of SDC corrections.

[7] http://bear.cba.ufl.edu/ritter/ipodata.htm.

[8] http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

Table I. Summary Statistics of Firm, Offer, and Market Characteristics

NMGR is the number of managing underwriters in the syndicate. UWR is the average Carter and Manaster (1990) underwriter rating of all lead underwriters in the IPO. APA is the absolute value of the percentage change from the middle of the filing range to the offer price. The market value of equity, MV, is the number of shares outstanding times the close price on the first day of trading in millions of 2006 dollars using CPI. BV is the book value of equity after the offer. AGE is the number of years between the IPO date and the company's founding date. VENTURE is equal to one when the IPO is VC backed, and zero otherwise. BUYOUT is equal to one when the IPO is a reverse leveraged buyout, and zero otherwise. VOL is the residual daily percent return standard deviation measured in the one-month period starting the day after the offer. The residual return volatility is the residual from the regression of daily firm returns on a constant and the value-weighted CRSP return. The first-day return, FDRET, is the percentage change from the offer price to the first day closing market price. Market-adjusted compounded abnormal returns (MBHARs) are calculated as the difference between the IPO's buy-and-hold return and the compounded return from the CRSP equal-weighted index using calendar-month returns starting at the end of month $t+1$ for IPOs going public during month t for a 35-month period or until the delisting date, whichever is earlier. Style-adjusted compounded abnormal returns (BHARs) are calculated as the difference between the IPO's buy-and-hold return and the compounded return from an equal-weighted portfolio matched on size and book-to-market, using calendar-month returns starting at the end of month $t+1$ for IPOs going public during month t for a 35-month period or until the delisting date, whichever is earlier. The sample includes 7,407 IPOs from 1980 to 2006, covered by CRSP within the first 30 days of the offer, with an offer price of at least \$5 and a CRSP share code of 10 or 11 of domestic companies.

Variables	*N*	Mean	Std. Dev.	Median	Min	Max
Panel A. Firm and Offer Characteristics						
NMGR	7,407	2.29	1.46	2.00	1.00	28.00
UWR	6,558	7.05	2.19	8.00	0.00	9.00
APA (%)	7,376	14.07	16.29	9.38	0.00	344.44
MV	7,407	389.32	1,398.06	128.48	2.55	63,007.63
BV/MV	6,250	0.43	0.96	0.31	−3.17	54.12
AGE	7,167	15.92	21.73	8.00	0.00	165.00
VENTURE	7,407	0.37	0.48	0.00	0.00	1.00
BUYOUT	7,407	0.10	0.30	0.00	0.00	1.00
Panel B. Market Characteristics						
VOL (%)	7,406	3.64	2.49	3.03	0.00	35.46
FDRET (%)	7,407	17.36	39.19	6.03	−57.50	697.50
MBHAR 3-Yr (%)	7,401	−14.01	183.79	−56.46	−232.30	3,980.01
BHAR 3-Yr (%)	6,145	−12.77	183.62	−50.10	−322.99	3,988.53

the underwriting syndicate with a standard deviation of 1.46. This number ranges from 1 to 28 managing underwriters. Underwriter reputation (UWR), which is the average Carter and Manaster (1990) rating of all lead underwriters in the IPO, is 7.05 in mean and 8.00 in median, similar to that found by Loughran and Ritter (2004) and Chan et al. (2008). Absolute price adjustment (APA), measured as the absolute value of the percentage change from the middle of the filing range to the offer price, is 14.07% in mean and 9.38% in median, indicating substantial underwriter learning during IPO bookbuilding. Statistics for the remaining firm and offer characteristics are comparable to those found in other studies.

Panel B offers IPO market characteristics. We use residual volatility (VOL) as a measure of firm uncertainty. VOL is defined as the daily residual percentage return standard deviation

measured over the one-month period starting the day after the offer, where the residual is from the regression of daily returns on a constant and the value-weighted CRSP return. We examine compounded long-run stock returns over the three years after the IPO excluding the first partial month after the IPO and the subsequent calendar month.[9] We calculate compounded returns using monthly returns from the beginning of the holding period until the end of the holding period or the delisting date, whichever is earlier. Market-adjusted compounded abnormal returns (MBHARs) are the buy-and-hold returns for the IPO minus the compounded returns for the equal-weighted CRSP index over the same period. Style-adjusted compounded abnormal returns (BHARs) are the difference between the IPO's buy-and-hold return and the compounded return from an equal-weighted portfolio matched on size and book-to-market, where the firms within the first three years of appearing in the CRSP database are removed from the benchmark matching portfolios.[10] The MBHARs and BHARs are negative in mean and highly negative in median. As later demonstrated, this result is driven largely by the strong negative returns in the bubble period.

Table II reports yearly means for certain offer and market characteristics over the entire sample period (1980-2006). The number of IPOs each year is similar to the numbers documented in previous studies. There is a clear time trend in the number of managing underwriters, increasing steadily until 2006. The yearly number of managing underwriters and the increasing time pattern is consistent with Loughran and Ritter (2004). Underwriter reputation and absolute price adjustment, however, remain fairly stable through time except for the bubble period (1999-2000) when absolute price adjustment sees a significant upward spike. Therefore, we also report the averages over the entire period (All) as well as the entire period excluding years 1999 and 2000 (Nonbubble). In order to control for the time trend, we sort NMGR, UWR, and APA on a yearly basis in our portfolio tests in later sections. Although not as stark, VOL also increases through time in the 1980s and 1990s, most notably in the late 1990s. It then declines after the bubble period.

We also break down equal- and value-weighted mean style-adjusted returns (BHAR) by year. There is no apparent time trend. Overall, for all IPOs in our sample, mean equal- and value-weighted BHARs are –12.8% and –16.1%, respectively (significantly different from zero based on *t*-statistics). However, this is driven largely by the poor performance of the bubble period IPOs. There is no general underperformance in the nonbubble period when returns are value weighted, consistent with the Brav and Gompers' (1997) results for IPOs in the 1972-1992 period.

We sort the sample firms yearly into three portfolios based on NMGR, UWR, or APA and examine the portfolio characteristics of IPOs with low, medium, and high underwriter quality proxies in Table III. Specifically, we sort the sample firms yearly into three portfolios based on NMGR, UWR, or APA. Due to the large number of IPOs with NMGR values of one, two, or three, and the clustering of UWR values at integers from 1 to 9, some of the years in our sample have only two portfolios. For example, in the early 1980s, firms with one manager are assigned to the

[9] Long-run returns are computed excluding the first partial month after the IPO and the subsequent calendar month to avoid possible endogeneity between returns and our uncertainty proxy (VOL), which is measured during the first month after the IPO. Therefore, the three-year returns span 35 months. Monthly returns used for computing long-run compounded returns do not include the delisting return if a stock is delisted. Including it has minimal effects on our results.

[10] Specifically, we use the 25 (5 × 5) size and book-to-market portfolio breakpoints obtained from Kenneth French's website and compute portfolio returns using firms in CRSP, excluding firms within the first three years of appearing in the database. These breakpoints create 25 portfolios to which each IPO stock can be assigned. For our sample of IPO firms, we calculate the market value of the firm at the end of the first day of the offer, and the book value is the first available after the offer from Thomson-Reuters New Issues database. We then use these values to assign the IPO to the appropriate portfolio. The purpose of removing firms within three years of appearing in CRSP is to remove the influence of IPO-like firms in the benchmark portfolios in the computation of BHARs. Keeping these newly listed firms in the benchmark portfolios does not materially affect our results.

Table II. Yearly Summary Statistics of Offer and Market Characteristics

N is the number of IPOs. NMGR is the number of managing underwriters in the syndicate. UWR is the average Carter and Manaster (1990) underwriter rating of all lead underwriters in the IPO. APA is the absolute value of the percentage change from the middle of the filing range to the offer price. VOL is the daily percent return standard deviation measured in the one-month period starting the day after the offer. Style-adjusted compounded abnormal returns (BHARs) are calculated as the difference between the IPO's buy-and-hold return and the compounded return from an equal-weighted portfolio matched on size and book-to-market using calendar-month returns starting at the end of month $t+1$ for IPOs going public during month t for a 35-month period or until the delisting date, whichever is earlier. We use 2006 CPI-adjusted market capitalization to value-weight returns. The sample includes 7,407 IPOs from 1980 to 2006. The nonbubble period excludes IPOs from 1999 and 2000. BHARs are available for 6,145 IPOs from 1980 to 2006 and for 5,438 IPOs in the nonbubble period.

Year	*N*	NMGR	UWR	APA (%)	VOL (%)	3-Yr BHAR (%)	
						Equal Weighted	Value Weighted
1980	74	1.38	6.48	13.45	3.06	38.47	−16.09
1981	192	1.36	5.89	10.23	2.81	−18.97	−20.60
1982	80	1.39	6.40	12.99	2.92	−8.41	−45.00
1983	502	1.49	6.50	12.05	2.70	20.31	−13.70
1984	209	1.59	6.35	13.83	2.15	25.02	6.20
1985	218	1.49	7.53	7.82	2.16	−14.40	−13.94
1986	477	1.51	7.46	8.31	2.47	−5.69	−5.63
1987	327	1.72	7.37	9.09	3.11	1.05	21.20
1988	131	1.67	7.65	8.38	2.10	−4.42	−33.37
1989	119	1.64	7.45	9.07	2.47	6.74	−15.70
1990	116	1.87	7.58	13.86	2.84	−54.81	−48.95
1991	285	1.92	7.52	11.62	3.33	−19.75	2.42
1992	404	1.95	6.99	15.18	3.42	−14.44	3.02
1993	528	1.97	6.73	12.14	3.43	−21.30	−20.56
1994	420	1.89	6.19	12.63	3.18	0.99	7.59
1995	463	2.19	6.69	14.64	3.76	−26.36	−7.55
1996	685	2.28	6.73	13.84	3.87	−2.70	96.13
1997	458	2.38	6.69	14.21	3.53	−4.40	19.99
1998	282	2.70	7.05	13.86	4.11	−34.08	8.16
1999	450	3.38	7.80	26.71	7.59	−75.49	−66.77
2000	335	3.61	8.08	27.62	7.92	−49.21	−45.95
2001	68	4.16	7.94	15.53	4.10	37.77	12.74
2002	62	4.16	7.81	12.74	3.41	−1.70	13.14
2003	66	3.95	7.70	11.44	2.61	−20.67	−23.73
2004	163	4.34	7.64	17.03	2.85	−2.66	25.95
2005	151	4.40	7.52	14.15	2.53	2.52	21.73
2006	142	4.53	7.64	15.39	2.60	−8.51	1.88
All	7,407	2.29	7.05	14.07	3.64	−12.77	−16.05
Nonbubble	6,622	2.15	6.94	12.52	3.16	−6.04	11.96

"Low" portfolio in some years with no firms assigned to the "Mid" portfolio and the remaining firms assigned to the "High" portfolio. In other years, firms with one manager are assigned to the "Mid" portfolio with no firms assigned to the "Low" portfolio and the remaining firms assigned to the "High" portfolio. We do this to establish a relative ranking in each time period, while creating portfolios that are as balanced as possible. Panels A, B, and C present the mean

Table III. Summary Characteristics of NMGR, UWR, and APA Portfolios

We sort the sample firms into three NMGR/UWR/APA portfolios by ranking NMGR/UWR/APA yearly. NMGR is the number of managing underwriters in the syndicate. UWR is the average Carter and Manaster (1990) underwriter rating of all lead underwriters in the IPO. APA is the absolute value of the percentage change from the middle of the filing range to the offer price. The market value of equity, MV, is the number of shares outstanding times the close price on the first day of trading in millions of 2006 dollars. BV is the book value of equity after the offer. AGE is the number of years between the IPO date and the company's founding date. VENTURE is equal to one when the IPO is VC backed, and zero otherwise. BUYOUT is equal to one when the IPO is a reverse leveraged buyout, and zero otherwise. VOL is the residual daily percent return standard deviation measured in the one-month period starting the day after the offer. The residual return volatility is the residual from the regression of daily firm returns on a constant and the value-weighted CRSP return. The numbers in parentheses are *t*-statistics based on simple *t*-tests for differences in means. The sample includes 7,407 IPOs from 1980 to 2006.

	NMGR	UWR	APA (%)	MV	BV/MV	AGE	VENTURE	BUYOUT	VOL (%)
Panel A. NMGR Portfolios									
Low NMGR	1.31	5.68	10.96	157.31	0.45	14.39	0.25	0.06	3.55
Mid NMGR	2.25	7.41	15.76	264.14	0.38	14.35	0.46	0.10	3.88
High NMGR	3.45	8.14	15.94	782.02	0.46	19.21	0.42	0.14	3.51
High-Low NMGR	2.15***	2.46***	4.98***	624.70***	0.01	4.82***	0.17***	0.08***	−0.03
	(57.01)	(41.31)	(10.71)	(13.56)	(0.22)	(7.34)	(12.93)	(9.02)	(−0.46)
All IPOs	2.29	7.05	14.07	389.32	0.43	15.92	0.37	0.10	3.64
Panel B. UWR Portfolios									
Low UWR	1.69	4.48	10.96	135.64	0.44	12.23	0.25	0.04	3.68
Mid UWR	2.37	7.76	15.10	267.64	0.40	15.20	0.44	0.12	3.49
High UWR	2.91	8.84	16.71	782.26	0.49	21.03	0.42	0.15	3.64
High-Low UWR	1.22***	4.36***	5.75***	646.62***	0.05	8.80***	0.17***	0.11***	−0.04
	(27.40)	(107.57)	(11.35)	(12.99)	(1.28)	(12.58)	(11.82)	(11.94)	(−0.52)
All IPOs	2.33	7.05	14.29	400.11	0.44	16.29	0.37	0.10	3.61
Panel C. APA Portfolios									
Low APA	2.16	6.31	1.98	272.58	0.47	15.82	0.28	0.09	3.54
Mid APA	2.34	7.29	10.75	373.27	0.43	17.26	0.36	0.11	3.59
High APA	2.36	7.53	29.48	523.97	0.39	14.70	0.47	0.10	3.81
High-Low APA	0.20***	1.22***	27.50***	251.40***	−0.08**	−1.12*	0.19***	0.01	0.27***
	(4.79)	(18.05)	(70.15)	(6.01)	(−2.28)	(−1.81)	(14.02)	(1.35)	(3.85)
All IPOs	2.29	7.05	14.07	389.87	0.43	15.92	0.37	0.10	3.64

***Significant at the 0.01 level.
**Significant at the 0.05 level.
*Significant at the 0.10 level.

characteristics of the NMGR, UWR, and APA portfolios, respectively. All three proxies increase monotonically within each of the three portfolios. This supports the idea that NMGR, UWR, and APA all capture underwriter quality to some extent. In addition, IPOs with high NMGR and UWR are larger and older, more likely to be backed by venture capitalists, and more likely to be a reverse leveraged buyout. However, high-APA IPOs tend to be younger with a lower book-to-market ratio and greater volatility. They also have no relationship with reverse leveraged buyouts.

III. Portfolio Tests

In this section, we first present long-run return results for univariate portfolios sorted by NMGR, UWR, or APA. We then provide results for bivariate portfolios sorted by NMGR, UWR, or APA and VOL, our uncertainty measure.

A. Univariate Sorts

In this subsection, we examine the nonbubble period (1980-1998 and 2001-2006) as well as the bubble period (1999-2000) IPOs. We examine the bubble period separately for two reasons. First, there is evidence of a changing objective of issuers and the role of underwriters during this period. For example, Loughran and Ritter (2004) posit that excessive underpricing during the bubble period relative to other periods can be attributed to a changing issuer objective function where there was less focus on maximizing IPO proceeds due to an increased emphasis on analyst coverage (the analyst lust hypothesis).[11] Furthermore, allocations of hot IPOs to the personal brokerage accounts of issuing firm executives created an incentive to seek rather than avoid underwriters with a reputation for severe underpricing (the spinning hypothesis). As such, it is possible that during the bubble period, the impact of underwriters on long-run stock returns was also different. Additionally, as noted earlier, the Fama and French (1993) factors may not be appropriate risk controls for the bubble period (Ritter and Welch, 2002).

1. Nonbubble Period

Figure 1 provides an initial look at the long-run stock return performance of IPOs by graphing annual style-adjusted compounded abnormal returns (BHARs) of a zero investment high minus low NMGR portfolio, a high minus low UWR hedge portfolio, and a high minus low APA hedge portfolio for each of the first four years after the offer. High managing underwriter IPOs exhibit better style-adjusted returns than low managing underwriter IPOs in each of the first four years after the offer. Similar results are documented for the high minus low UWR hedge portfolio and the high minus low APA hedge portfolio (except for the Year 3 and Year 4 high minus low APA hedge portfolios). More importantly, these results hold in the first three years when we value-weight each NMGR, UWR, and APA portfolio. This suggests that the variation in long-run performance is not limited to small IPOs.

Table IV reports market-adjusted compounded returns (MBHARs) and style-adjusted compounded returns (BHARs).[12] The statistical significance of the hedge portfolio (such as High-Low NMGR) is assessed by the *t*-statistic of the hedge portfolio based on a two-tailed *t*-test and

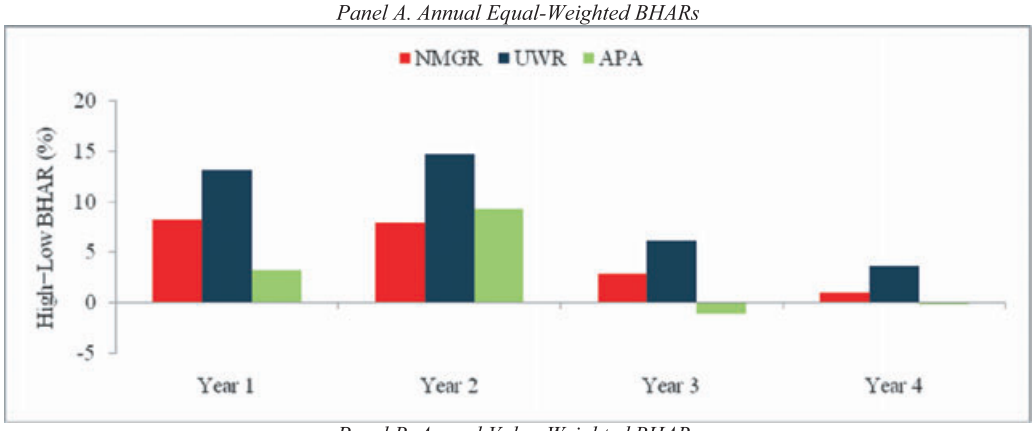
[11] Cliff and Denis (2004) provide empirical evidence that supports this conjecture.

[12] In unreported tests, we assess the influence of return outliers by winsorizing returns at the 1st and 99th percentiles. All of our conclusions regarding univariate and bivariate portfolio sorts, and event-time and calendar-time regressions remain unchanged with somewhat reduced magnitudes especially when returns are value weighted.

Figure 1. Annual Style-Adjusted Return Differential between High- and Low-NMGR/UWR/APA IPO Portfolios

Panels A and B plot equal and value-weighted compounded abnormal returns for Years 1, 2, 3, and 4 after the offer (excluding the first partial month after the IPO and the subsequent calendar month), for the High-Low NMGR/UWR/APA hedge portfolios, respectively. We sort the sample firms into three NMGR/UWR/APA portfolios by ranking NMGR/UWR/APA yearly. NMGR is the number of managing underwriters in the syndicate. UWR is the average Carter and Manaster (1990) underwriter rating of all lead underwriters in the IPO. APA is the absolute value of the percentage change from the middle of the filing range to the offer price. Style-adjusted compounded abnormal returns (BHARs) are calculated as the difference between the IPO's buy-and-hold return and the compounded return from an equal-weighted portfolio matched on size and book-to-market using calendar-month returns starting at the end of month $t+1$ for IPOs going public during month t for various time intervals. Compounded returns are calculated using monthly returns from the beginning of the holding period until the end of the holding period or the delisting date, whichever is earlier. We use 2006 CPI-adjusted market capitalization to value-weight returns. The sample includes 6,622 IPOs from 1980 to 2006, excluding the bubble period (1999 and 2000). BHARs are available for 5,438 IPOs.

Panel A. Annual Equal-Weighted BHARs



Panel B. Annual Value-Weighted BHARs

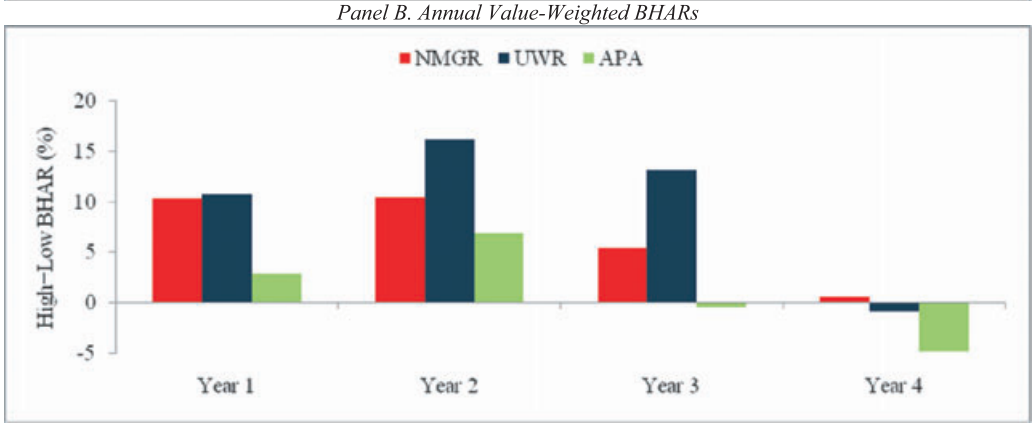


Table IV. Long-run Market and Style-Adjusted Returns of NMGR, UWR, and APA Portfolios for Nonbubble Periods

This table reports high, medium, and low excess NMGR, UWR, and APA IPOs' buy-and-hold abnormal returns over three years after the offer (skipping the first month). We sort the sample firms into three NMGR/UWR/APA portfolios by ranking NMGR/UWR/APA yearly. Market-adjusted compounded abnormal returns (MBHARs) are calculated as the difference between the IPO's buy-and-hold return and the compounded return from the CRSP equal-weighted index using calendar-month returns starting at the end of month $t+1$ for IPOs going public during month t for a 35-month period or until the delisting date, whichever is earlier. Style-adjusted compounded abnormal returns (BHARs) are calculated as the difference between the IPO's buy-and-hold return and the compounded return from an equal-weighted portfolio matched on size and book-to-market using calendar-month returns starting at the end of month $t+1$ for IPOs going public during month t for a 35-month period or until the delisting date, whichever is earlier. We use 2006 CPI-adjusted market capitalization to value-weight returns. NMGR is the number of managing underwriters in the syndicate. UWR is the average Carter and Manaster (1990) underwriter rating of all lead underwriters in the IPO. APA is the absolute value of the percentage change from the middle of the filing range to the offer price. The numbers in parentheses are t-statistics based on simple t-tests for differences in means. The row titled Emp. p-value reports observed significance levels from a randomization procedure designed to control for clustering, autocorrelation, and skewness of the original sample under the null hypothesis. The sample includes 6,622 IPOs from 1980 to 2006 excluding the bubble period (1999 and 2000). BHARs are available for 5,438 IPOs.

	3-Yr MBHAR (%)		3-Yr BHAR (%)	
	Equal Weighted	**Value Weighted**	**Equal Weighted**	**Value Weighted**
Panel A. NMGR Portfolios				
Low NMGR	−24.08	−19.46	−17.22	−14.59
Mid NMGR	−8.29	−4.57	−6.57	−2.64
High NMGR	12.02	23.74	8.82	25.21
High-Low NMGR	36.10***	43.21***	26.05***	39.80***
	(6.30)	(5.56)	(4.20)	(4.72)
Emp. p-value	0.000	0.142	0.000	0.203
All IPOs	−7.94***	10.20***	−6.04**	11.96***
	(−3.38)	(4.18)	(−2.28)	(4.42)
Panel B. UWR Portfolios				
Low UWR	−29.79	−25.09	−24.67	−16.69
Mid UWR	−0.53	−7.06	2.02	−8.04
High UWR	11.59	26.47	8.97	29.23
High-Low UWR	41.38***	51.56***	33.65***	45.92***
	(7.17)	(5.56)	(5.26)	(4.55)
Emp. p-value	0.000	0.071	0.000	0.171
All IPOs	−6.33***	11.36***	−4.92*	12.84***
	(−2.57)	(4.37)	(−1.82)	(4.43)
Panel C. APA Portfolios				
Low APA	−15.04	−0.91	−13.91	−3.39
Mid APA	−10.15	11.28	−7.21	16.78
High APA	1.61	17.48	3.62	18.81
High-Low APA	16.64***	18.39***	17.53***	22.20***
	(2.67)	(2.81)	(2.54)	(3.02)
Emp. p-value	0.007	0.468	0.011	0.428
All IPOs	−7.86***	10.29***	−5.87**	12.14***
	(−3.34)	(4.20)	(−2.31)	(4.48)

***Significant at the 0.01 level.
**Significant at the 0.05 level.
*Significant at the 0.10 level.

by the empirical *p*-value. The empirical *p*-value reports the observed significance level from a randomization procedure designed to control for clustering, autocorrelation, and skewness of the original sample under the null hypothesis (Purnanandam and Swaminathan, 2004).

Focusing on the three NMGR portfolios in Panel A, we note that even though the number of managing underwriters only increases by about one member in each portfolio, there is substantial variation in long-run performance. Specifically, high-NMGR IPOs have 26.1% higher mean three-year equal-weighted style-adjusted returns than do low-NMGR IPOs. The difference is highly significant. The Panel B results for UWR are even starker than the NMGR portfolios. Specifically, high-UWR IPOs have 33.7% higher mean three-year equal-weighted style-adjusted returns than low-UWR IPOs. Finally, Panel C reports the corresponding long-run returns for APA, yielding results analogous to those for NMGR and UWR. High-APA IPOs have 17.5% higher mean three-year equal-weighted style-adjusted returns than low-APA IPOs. These patterns hold when returns are value weighted. In fact, value weighting returns generally strengthens the return differentials between high- and low-marketing IPOs, although they are somewhat lower in statistical significance, confirming that these results are not driven by small IPOs.

The results reported in Table IV provide preliminary evidence that greater underwriter quality proxies are associated with better long-run IPO performance. Furthermore, the finding that IPOs with high NMGR (or UWR, APA) earn positive abnormal returns implies that these stocks were substantially undervalued in the market shortly after the IPO.

2. Bubble Period

Table V reports market-adjusted compounded returns and style-adjusted compounded returns during the Internet bubble period (1999-2000). We first note that for the 707 IPOs with nonmissing BHARs in this period, mean style-adjusted BHARs are all significantly negative for three years after the offer. This is consistent with the severe collapse of Internet IPOs documented in the press and in the literature. It is interesting to note the reversal of the nonbubble results of Table IV. Greater NMGR, generally leads to lower three-year returns. For example, high-NMGR IPOs have a 13.5% lower mean equal-weighted three-year BHAR than low-NMGR IPOs. The correlation between UWR and long-run returns is essentially flat. In addition, high-APA stocks earn lower three-year BHARs than low-APA stocks when returns are value weighted. Overall, although the sign and statistical significance are not uniform across the portfolios, it is clear that underwriters had a different impact on long-run performance in the bubble period when compared to the nonbubble period.

These results may be explained by a changing objective function hypothesis in the spirit of Loughran and Ritter (2004). For example, it is possible that during the bubble period, some large syndicates or reputable underwriters wanted to hype IPOs to maximize profits from current deals based on the view that the bubble was a once-in-a-lifetime profit opportunity. In this case, "successful" underwriting around the time of the IPO may have caused short-run overvaluation and long-run underperformance of the bubble period IPOs.

Of course, there are other possible explanations for the bubble period results. Perhaps large managing syndicates and reputable underwriters were overly optimistic about hi-tech IPOs. However, anecdotal evidence suggests that at least some star analysts affiliated with reputable brokerage houses hyped hi-tech IPOs during the bubble years (e.g., Jack Grubman, the star telecom analyst of Salomon Smith Barney, was permanently banned from the securities industry for hyping telecom stocks).[13]

[13] See, e.g., http://www.sec.gov/news/press/2003–55.htm.

Table V. Long-run Market and Style-Adjusted Returns of NMGR, UWR, and APA Portfolios for the Bubble Period

This table reports high, medium, and low excess NMGR, UWR and APA IPOs' buy-and-hold abnormal returns over three years after the offer (skipping the first month). We sort the sample firms into three NMGR/UWR/APA portfolios by ranking NMGR/UWR/APA yearly. Market-adjusted compounded abnormal returns (MBHARs) are calculated as the difference between the IPO's buy-and-hold return and the compounded return from the CRSP equal-weighted index, using calendar-month returns starting at the end of month $t+1$ for IPOs going public during month t for a 35-month period or until the delisting date, whichever is earlier. Style-adjusted compounded abnormal returns (BHARs) are calculated as the difference between the IPO's buy-and-hold return and the compounded return from an equal-weighted portfolio matched on size and book-to-market, using calendar-month returns starting at the end of month $t+1$ for IPOs going public during month t for a 35-month period or until the delisting date, whichever is earlier. We use 2006 CPI-adjusted market capitalization to value-weighted returns. NMGR is the number of managing underwriters in the syndicate. UWR is the average Carter and Manaster (1990) underwriter rating of all lead underwriters in the IPO. APA is the absolute value of the percentage change from the middle of the filing range to the offer price. The numbers in parentheses are t-statistics based on simple t-tests for differences in means. The row titled Emp. p-value reports observed significance levels from a randomization procedure designed to control for clustering, autocorrelation, and skewness of the original sample under the null hypothesis. The sample includes 785 IPOs from the bubble period (1999 and 2000). BHARs are available for 707 IPOs.

	3-Yr MBHAR (%)		3-Yr BHAR (%)	
	Equal Weighted	**Value Weighted**	**Equal Weighted**	**Value Weighted**
Panel A. NMGR Portfolios				
Low NMGR	−61.71	−67.41	−55.24	−47.29
Mid NMGR	−58.00	−73.37	−69.84	−73.96
High NMGR	−72.01	−80.90	−68.70	−56.48
High-Low NMGR	−10.30	−13.49**	−13.46**	−9.19
	(−1.62)	(−2.40)	(−1.97)	(−1.45)
Emp. p-value	0.102	0.165	0.131	0.489
All IPOs	−65.17***	−77.75***	−64.53***	−58.01***
	(−19.35)	(−34.54)	(−17.19)	(−22.15)
Panel B. UWR Portfolios				
Low UWR	−61.83	−81.25	−59.16	−58.70
Mid UWR	−67.07	−73.53	−80.89	−80.90
High UWR	−66.18	−75.28	−60.60	−52.47
High-Low UWR	−4.35	5.97	−1.45	6.23
	(−0.51)	(0.76)	(−0.16)	(0.72)
Emp. p-value	0.615	0.658	0.882	0.725
All IPOs	−65.00***	−75.82***	−64.29***	−56.42***
	(−17.79)	(−30.79)	(−15.72)	(−19.71)
Panel C. APA Portfolios				
Low APA	−61.97	−59.58	−64.88	−45.82
Mid APA	−64.53	−60.83	−67.45	−43.31
High APA	−70.75	−90.39	−63.55	−69.04
High-Low APA	−8.78	−30.82***	1.33	−23.21***
	(−1.03)	(−4.94)	(0.15)	(−3.39)
Emp. p-value	0.310	0.004	0.884	0.068
All IPOs	−65.75***	−77.95***	−65.26***	−58.28***
	(−19.79)	(−34.96)	(−17.70)	(−22.49)

***Significant at the 0.01 level.
**Significant at the 0.05 level.

B. Bivariate Sorts

In this section, we analyze bivariate portfolios sorted by underwriter quality proxies and an uncertainty proxy. We form nine (3 × 3) NMGR-VOL portfolios by independently sorting the sample firms into three NMGR and three VOL portfolios and intersecting these portfolios. Similarly, we form nine UWR-VOL portfolios and nine APA-VOL portfolios.[14] This test is similar to those of Boehme et al. (2006) and Boehme et al. (2009) who relate stock returns to volatility and another firm characteristic without restricting the sample to IPOs.

Figure 2 depicts the three-year BHARs of the High-Low NMGR, UWR, and APA hedge portfolios for low-, medium-, and high-VOL IPOs. We first note that high-NMGR IPOs exhibit better three-year BHARs than low-NMGR IPOs for each VOL portfolio (all the High-Low NMGR mean hedge profits are positive) for both equal- and value-weighted returns. We further note an increase in the High-Low NMGR hedge profit from the low- to high-VOL portfolio. This suggests that having more managing underwriters is most important for high uncertainty firms. Similar results are documented for the UWR and APA hedge portfolios.

Table VI presents the style-adjusted three-year BHARs of the bivariate portfolios. Focusing on the equal-weighted abnormal returns of the NMGR-VOL portfolios in Panel A, we find that the High-Low NMGR hedge profits are much higher among high-VOL firms than among low-VOL firms. For example, High-Low NMGR provides a highly significant return of 48.1% among high-VOL firms compared to an insignificant return difference of 4.1% among low-VOL firms. The difference in the NMGR hedge profit between the high- and low-VOL columns is statistically significant. The results for UWR on three-year equal-weighted returns are similar in magnitude. The High-Low UWR portfolio return is 49.9% among high-VOL firms compared with a spread of 19.4% among low-VOL firms. Again, the difference in the UWR hedge profit between the high- and low-VOL columns is statistically significant. Finally, the APA-VOL results yield similar conclusions. The three-year equal-weighted High-Low APA portfolio return is 37.6% among high-VOL firms compared to an insignificant spread of 8.8% among low-VOL firms. This difference is statistically significant.

When we value weight returns, the effects of the underwriter quality proxies on long-run performance are generally even higher in magnitude, although the difference in performance is no longer statistically significant when empirical *p*-values are used.[15] For example, the value-weighted High-Low NMGR spread in three-year abnormal returns increases from 26.9% for the low-VOL portfolio to 81.6% for the high-VOL portfolio. The value-weighted UWR hedge profit increases from 41.7% for the low-VOL portfolio to 90.6% for the high-VOL portfolio while the APA hedge profit increases from an insignificant 0.31% for the low-VOL portfolio to 62.9% for the high-VOL portfolio. The value-weighted results confirm that better performance from greater underwriter quality proxies among high-VOL firms is not limited to small IPOs.

In Panel C of Table VI, we also offer the number of observations in each of the bivariate NMGR-VOL, UWR-VOL, and APA-VOL portfolios. The number of IPOs does not exhibit a

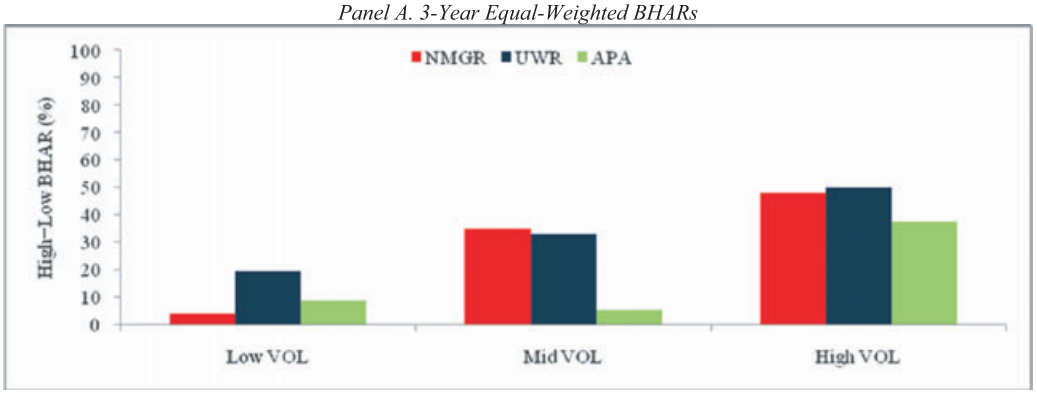
[14] In the Table VI bivariate sorts, the underwriter quality proxies (NMGR, UWR, and APA) are sorted yearly while VOL is not. We attempted sorting VOL yearly, but the effect we are capturing with respect to volatility appears to be more of a time-series effect than a cross-sectional effect. In other words, underwriter quality is more important in periods where IPOs have greater firm-specific uncertainty.

[15] One possible reason why value-weighted returns are less significant using empirical *p*-values is that the randomization procedure used to generate the empirical *p*-values reassigns firms randomly to high-, medium-, or low-NMGR/UWR/APA portfolios on a yearly basis. This may destroy the inherently positive correlation between NMRG/UWR/APA and firm size (MV)—documented in Table III—which could then produce an unrepresentative value-weighted empirical distribution. A second possible reason is that value-weighted portfolios do not diversify idiosyncratic risk as well, so that a big firm (such as the 2000 AT&T Wireless IPO) may dominate a portfolio.

Figure 2. Style-Adjusted Return Differential between High- and Low-NMGR/UWR/APA Portfolios, for Low-, Medium-, and High-VOL IPOs

Panels A and B plot equal- and value-weighted style-adjusted compounded abnormal returns for three years after the offer (excluding the first partial month after the IPO and the subsequent calendar month) for the High-Low NMGR/UWR/APA hedge portfolio, for low-, medium-, and high-VOL firms as reported in Table VI. We form nine (3 × 3) NMGR/UWR/APA VOL portfolios by independently sorting the sample firms into three NMGR/UWR/APA and three VOL portfolios and intersecting these portfolios. In forming the NMGR/UWR/APA and VOL portfolios, NMGR/UWR/APA is ranked yearly while VOL is ranked once over the sample period. NMGR is the number of managing underwriters in the syndicate. UWR is the average Carter and Manaster (1990) underwriter rating of all lead underwriters in the IPO. APA is the absolute value of the percentage change from the middle of the filing range to the offer price. VOL is the daily percent return standard deviation measured in the one-month period starting the day after the offer. Style-adjusted compounded abnormal returns (BHARs) are calculated as the difference between the IPO's buy-and-hold return and the compounded return from an equal-weighted portfolio matched on size and book-to-market, using calendar-month returns starting at the end of month $t+1$ for IPOs going public during month t for a 35-month period or until the delisting date, whichever is earlier. We use 2006 CPI-adjusted market capitalization to value-weight returns. The sample includes 6,622 IPOs from 1980 to 2006, excluding the bubble period (1999 and 2000). BHARs are available for 5,438 IPOs.

Panel A. 3-Year Equal-Weighted BHARs



Panel B. 3-Year Value-Weighted BHARs

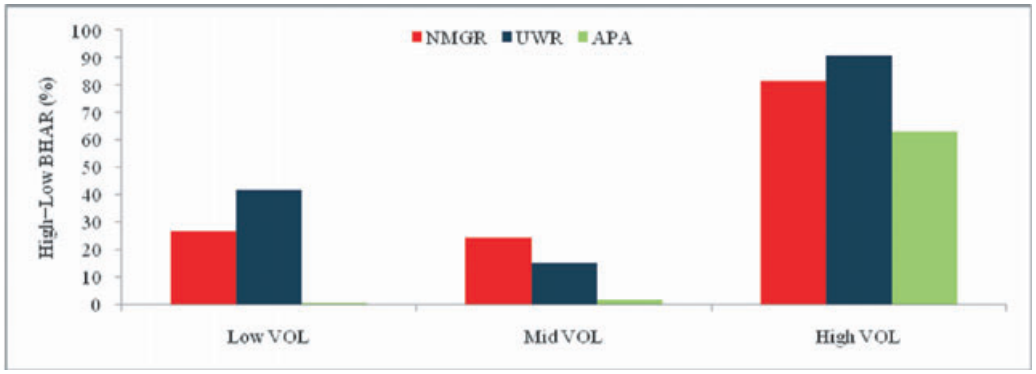


Table VI. Long-run Style-Adjusted Returns for Bivariate Portfolios

This table reports equal and value-weighted buy-and-hold abnormal returns over the three years after the offer (skipping the first month) for NMGR/UWR/APA VOL bivariate portfolios. We form nine (3 × 3) NMGR/UWR/APA VOL portfolios by independently sorting the sample firms into three NMGR/UWR/APA and three VOL portfolios and intersecting these portfolios. In forming the NMGR/UWR/APA and VOL portfolios, NMGR/UWR/APA are ranked yearly while VOL is ranked once over the sample period. Style-adjusted compounded abnormal returns (BHARs) are calculated as the difference between the IPO's buy-and-hold return and the compounded return from an equal-weighted portfolio matched on size and book-to-market using calendar-month returns starting at the end of month $t+1$ for IPOs going public during month t for a 35-month period or until the delisting date, whichever is earlier. We use 2006 CPI-adjusted market capitalization to value-weight returns. NMGR is the number of managing underwriters in the syndicate. UWR is the average Carter and Manaster (1990) underwriter rating of all lead underwriters in the IPO. APA is the absolute value of the percentage change from the middle of the filing range to the offer price. VOL is the daily percent return standard deviation measured in the one-month period starting the day after the offer. The sample includes 6,622 IPOs from 1980 to 2006 excluding the bubble period (1999 and 2000). BHARs are available for 5,438 IPOs.

	NMGR Portfolios				UWR Portfolios				APA Portfolios			
	Low	Mid	High	H-L	Low	Mid	High	H-L	Low	Mid	High	H-L
Panel A. Equal-Weighted Portfolios												
Low VOL	−7.03	−7.46	−2.95	4.08	−12.92	−5.47	6.43	19.35***,a	−11.90	0.35	−3.08	8.82
Mid VOL	−22.53	−3.50	12.24	34.77***,a	−27.56	2.44	5.42	32.98***,a	−8.49	−6.04	−3.37	5.12
High VOL	−23.90	−8.83	24.16	48.05***,a	−32.46	8.63	17.45	49.92***,a	−21.13	−17.01	16.49	37.62**,b
H-L VOL	−16.87**	−1.37	27.11**,c	43.97***,a	−19.54*,c	14.10	11.02	30.56*,c	−9.24	−17.36**,c	19.57	28.80*,c
Panel B. Value-Weighted Portfolios												
Low VOL	−3.15	−5.50	23.70	26.85***	−8.03	−15.76	33.63	41.65***	−4.69	51.97	−4.38	0.31
Mid VOL	−11.37	−6.68	13.16	24.53**	−2.89	−8.96	12.40	15.30	4.20	−3.78	5.86	1.66
High VOL	−34.33	2.44	47.29	81.62***	−46.49	1.13	44.13	90.62***	−12.25	−20.28	50.60	62.85***
H-L VOL	−31.18***	7.94	23.60	54.77**	−38.46***	16.89	10.51	48.97*	−7.57	−72.25***,b	54.97***	62.54***
Panel C. Number of Observations												
Low VOL	778	373	697		533	521	581		661	608	570	
Mid VOL	655	625	526		494	577	536		562	629	606	
High VOL	667	699	418		621	554	399		606	544	626	

***Significant at the 0.01 level (t-distribution).
**Significant at the 0.05 level (t-distribution).
*Significant at the 0.10 level (t-distribution).
[a]Significant at the 0.01 level (empirical distribution).
[b]Significant at the 0.05 level (empirical distribution).
[c]Significant at the 0.10 level (empirical distribution).

stark disproportion across the portfolios, suggesting that our results are not being driven by a lack of IPOs or a large number of IPOs in a given portfolio. However, the high-NMGR, high-VOL portfolio has only 418 firms, less than one-ninth of the sample IPOs (604), and the number of IPOs in the high NMGR column of portfolios decreases monotonically from low to high VOL. The number of observations for UWR provides a similar conclusion. These results suggest that higher underwriter quality by more and reputable managing underwriters is associated with lower volatility. Alternatively, the high-APA, high-VOL portfolio does not have less than one-ninth of the sample IPOs.

IV. Regression Analysis

A. Cross-Sectional Regressions

We use cross-sectional analysis to determine the impact of the number of managing underwriters, underwriter rating, and absolute price adjustment on factor-adjusted long-run returns, controlling for other variables that have been found to influence long-run performance. We test this cross-sectional relationship with the following multivariate regression model:

$$\alpha_i = \beta_0 + \beta_1 \text{ Ln}(\text{NMGR}_i) + \beta_2 \text{ FDRET}_i + \beta_3 \text{ VOL}_i + \beta_4 \text{ Ln}(\text{MV}_i) + \beta_5 \text{ Ln}(\text{BV}_i/\text{MV}_i) + \beta_6 \text{ Ln}(1 + \text{AGE}_i) + \beta_7 \text{ VENTURE}_i + \beta_8 \text{ BUYOUT}_i + \varepsilon_i. \quad (1)$$

Ln(NMGR) is the natural logarithm of the number of managing underwriters in the underwriting syndicate, demeaned by the average value across IPOs in the same calendar month. (UWR or APA can be included in place of Ln(NMGR)). FDRET is the first-day return defined as the percentage change from the offer price to the first-day closing market price. MV is the number of shares outstanding times the close price on the first day of trading. BV/MV is the book value of equity after the offer divided by the market value of equity. AGE is the number of years between a firm's founding year and the year of its IPO. VENTURE equals one when the IPO is backed by a VC firm, and zero otherwise. BUYOUT equals one when the IPO is a reverse leveraged buyout, and zero otherwise. VOL is the residual daily percent return standard deviation measured in the one-month period starting the day after the offer.

We measure long-run performance using event-time factor-adjusted returns based on the Lyandres et al. (2008) four-factor model, in the spirit of Purnanandam and Swaminathan (2004).[16] Specifically, we regress each IPO's monthly excess returns (in excess of the one-month Treasury bill return) from the second calendar month after the offer until three years after the offer or the delisting date, whichever is earlier, on the Fama and French (1993) factors and the investment factor ($R_m - R_f$, SMB, HML, and INV) for the same period. The factor-adjusted monthly percentage return is the intercept from this regression, α.

Regression results for three-year long-run factor-adjusted returns are reported in Table VII. Panel A displays results for all IPOs. The regression specifications in Models 1-3 present results for each underwriter quality proxy on its own. We find that the coefficients on Ln(NMGR) and UWR are positive and statistically significant in Models 1 and 2, respectively. The coefficient on APA, however, is not statistically significant in Model 3 (it is significant at the 11.6% level). Models 4-5, which include two of the proxies in each regression, continue to show significant effects of Ln(NMGR) and UWR and an insignificant effect of APA. In Model 7, we include all

[16] We thank the authors, Lyandres, Sun, and Zhang, for providing us with the investment factor.

Table VII. Regressions of Long-run Factor-Adjusted Returns on NMGR, UWR, APA, and Control Variables

The dependent variable is FF-α, the long-run monthly factor-adjusted return using the Fama and French (1993) three factors and Lyandres et al.'s (2008) investment factor as control variables. Specifically, we regress each IPO's monthly excess percentage returns, starting the beginning of the second full calendar month after the offer, on the Fama and French (1993) factors and Lyandres et al.'s (2008) investment factor ($R_m - R_f$, SMB, HML, INV) for a three-year period (35 months). The factor-adjusted return is the intercept from this regression: the average monthly factor-adjusted percentage return on an event-time basis. NMGR is the number of managing underwriters in the syndicate. Ln(NMGR) is the natural logarithm of NMGR detrended using the same calendar-month average Ln(NMGR). UWR is the average Carter and Manaster (1990) underwriter rating of all lead underwriters in the IPO. APA is the absolute value of the percentage change from the middle of the filing range to the offer price. The first-day return, FDRET, is the percentage change from the offer price to the first-day closing market price. VOL is the residual daily percent return standard deviation measured in the one-month period starting the day after the offer. The residual return volatility is the residual from the regression of daily firm returns on a constant and the value-weighted CRSP return. The market value of equity, MV, is the number of shares outstanding times the close price on the first day of trading in millions of 2006 dollars. BV is the book value of equity after the offer. AGE is the number of years between the IPO date and the company's founding date. VENTURE is equal to one when the IPO is VC backed, and zero otherwise. BUYOUT is equal to one when the IPO is a reverse leveraged buyout, and zero otherwise. The numbers in parentheses are *t*-statistics calculated with heteroskedasticity-consistent standard errors (using White's correction) which are robust to within year cluster correlation (clustered standard errors). The sample includes a maximum of 6,622 IPOs from 1980 to 2006 excluding the bubble period (1999 and 2000).

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
				Panel A. All IPOs			
Intercept	−2.31***	−2.79***	−2.77***	−2.35***	−2.40***	−2.84***	−2.40***
	(−4.46)	(−6.00)	(−6.02)	(−4.83)	(−4.53)	(−6.01)	(−4.79)
Ln(NMGR)	0.46**			0.48**	0.45**		0.48**
	(2.26)			(2.50)	(2.17)		(2.47)
UWR		0.22***		0.20***		0.21***	0.19***
		(5.34)		(5.14)		(5.55)	(5.29)
APA			0.01		0.01	0.00	0.00
			(1.63)		(1.54)	(0.67)	(0.61)
FDRET	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	(1.28)	(1.48)	(1.05)	(1.63)	(1.22)	(1.48)	(1.64)
VOL	0.10	0.14	0.10	0.14	0.10	0.14	0.14*
	(1.13)	(1.61)	(1.06)	(1.69)	(1.12)	(1.64)	(1.72)
Ln(MV)	0.24**	0.04	0.32***	−0.02	0.23**	0.05	−0.01
	(2.75)	(0.46)	(4.79)	(−0.23)	(2.78)	(0.57)	(−0.14)
Ln(BV/MV)	0.30**	0.20	0.35***	0.17	0.31**	0.21	0.18
	(2.34)	(1.56)	(2.87)	(1.29)	(2.42)	(1.66)	(1.38)
Ln(1+AGE)	0.29***	0.22**	0.30***	0.22**	0.30***	0.23**	0.23**
	(3.67)	(2.61)	(3.79)	(2.64)	(3.74)	(2.70)	(2.73)
VENTURE	0.25	−0.01	0.25	−0.04	0.21	−0.03	−0.06
	(1.31)	(−0.05)	(1.38)	(−0.21)	(1.10)	(−0.14)	(−0.29)
BUYOUT	−0.10	−0.21	−0.10	−0.21	−0.10	−0.21	−0.21
	(−0.30)	(−0.62)	(−0.30)	(−0.61)	(−0.30)	(−0.64)	(−0.62)
Adj. R^2	0.013	0.015	0.013	0.016	0.014	0.015	0.016
N	5,236	4,655	5,219	4,655	5,219	4,639	4,639

(*Continued*)

Table VII. Regressions of Long-run Factor-Adjusted Returns on NMGR, UWR, APA, and Control Variables *(Continued)*

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Panel B. High-VOL IPOs							
Intercept	−2.23	−2.44*	−2.88**	−1.61	−2.22	−2.44*	−1.61
	(−1.64)	(−1.90)	(−2.26)	(−1.19)	(−1.65)	(−1.90)	(−1.19)
Ln(NMGR)	0.80*			1.05**	0.78*		1.06**
	(1.81)			(2.58)	(1.72)		(2.56)
UWR		0.31***		0.25***		0.30***	0.23**
		(2.90)		(2.24)		(3.03)	(2.36)
APA			0.01		0.01	0.01	0.01
			(0.98)		(0.92)	(0.67)	(0.68)
FDRET	0.01*	0.01**	0.01	0.01***	0.01*	0.01**	0.01***
	(1.97)	(2.58)	(1.58)	(2.81)	(1.75)	(2.58)	(2.80)
VOL	0.09	0.14	0.08	0.16	0.10	0.14	0.16
	(0.52)	(0.77)	(0.46)	(0.86)	(0.53)	(0.77)	(0.87)
Ln(MV)	0.20	−0.13	0.32***	−0.24	0.17	−0.14	−0.25
	(1.11)	(−0.63)	(2.11)	(−1.13)	(0.99)	(−0.64)	(−1.14)
Ln(BV/MV)	0.15	0.03	0.20	−0.01	0.15	0.04	−0.00
	(0.80)	(0.17)	(1.12)	(−0.07)	(0.79)	(0.22)	(−0.02)
Ln(1+AGE)	0.15	0.00	0.16	0.01	0.15	0.01	0.02
	(0.85)	(0.02)	(0.93)	(0.09)	(0.86)	(0.05)	(0.12)
VENTURE	0.66	0.21	0.70*	0.14	0.61	0.18	0.11
	(1.62)	(0.53)	(1.98)	(0.33)	(1.60)	(0.48)	(0.28)
BUYOUT	0.13	−0.24	0.14	−0.23	0.14	−0.23	−0.22
	(0.36)	(−0.57)	(0.38)	(−0.55)	(0.39)	(−0.55)	(−0.53)
Adj. R^2	0.011	0.014	0.011	0.016	0.012	0.013	0.015
N	1,716	1,500	1,710	1,500	1,710	1,495	1,495
Panel C. Low-VOL IPOs							
Intercept	−1.47**	−1.51**	−1.79***	−1.25*	−1.54**	−1.53**	−1.28*
	(−2.23)	(−2.34)	(−3.19)	(−1.76)	(−2.44)	(−2.45)	(−1.87)
Ln(NMGR)	0.30			0.25	0.29		0.24
	(1.03)			(0.90)	(1.00)		(0.87)
UWR		0.15**		0.14**		0.15**	0.14**
		(2.29)		(2.22)		(2.34)	(2.23)
APA			0.00		0.00	−0.00	−0.00
			(0.40)		(0.37)	(−0.09)	(−0.12)
FDRET	−0.01	−0.00	−0.01	−0.00	−0.01	−0.00	−0.00
	(−0.52)	(−0.31)	(−0.43)	(−0.28)	(−0.39)	(−0.23)	(−0.20)
VOL	0.10	0.02	0.09	0.01	0.09	0.01	0.01
	(0.50)	(0.07)	(0.48)	(0.06)	(0.45)	(0.04)	(0.03)
Ln(MV)	0.11	−0.06	0.17**	−0.09	0.12	−0.05	−0.08
	(1.12)	(−0.60)	(2.22)	(−0.84)	(1.21)	(−0.50)	(−0.75)
Ln(BV/MV)	0.45**	0.27*	0.50***	0.25*	0.47***	0.29*	0.27*
	(2.79)	(1.96)	(3.20)	(1.79)	(2.88)	(2.02)	(1.86)
Ln(1+AGE)	0.30***	0.26***	0.31***	0.26***	0.31***	0.26***	0.26***
	(3.38)	(3.36)	(3.56)	(3.33)	(3.48)	(3.48)	(3.45)
VENTURE	0.23	0.03	0.25	0.01	0.23	0.04	0.02
	(0.77)	(0.09)	(0.85)	(0.03)	(0.75)	(0.12)	(0.07)
BUYOUT	0.11	0.08	0.09	0.09	0.11	0.08	0.09
	(0.30)	(0.23)	(0.25)	(0.26)	(0.29)	(0.21)	(0.24)
Adj. R^2	0.022	0.016	0.022	0.016	0.022	0.016	0.016
N	1,774	1,601	1,767	1,601	1,767	1,594	1,594

***Significant at the 0.01 level.
**Significant at the 0.05 level.
*Significant at the 0.10 level.

three of our underwriter quality proxies. In this specification, both Ln(NMGR) and UWR are statistically significant while APA is insignificant. The fact that Ln(NMGR) remains significant, controlling for UWR, suggests that the number of managing underwriters provides incremental explanatory power in predicting long-run returns above and beyond the underwriter reputation that is documented in the prior literature. In terms of economic significance, a one standard deviation increase in Ln(NMGR) leads to a 7.2% (0.43% $\times$ 0.48 $\times$ 35 months) increase in factor-adjusted returns over 35 months (where 0.43 is the standard deviation of Ln(NMGR) in the overall sample). For UWR, the economic impact is 14.8% over 35 months.

In Panels B and C of Table VII, we examine the underwriter quality proxies among high-VOL and low-VOL IPOs, respectively. Among high-VOL IPOs in Panel B, we find that the coefficients on both Ln(NMGR) and UWR are positive and statistically significant in each model while the coefficient on APA is insignificant, similar to our Panel A results. Moreover, the magnitude of Ln(NMGR)'s coefficient is about twice as large when compared to equivalent models in Panel A. Of particular note is Model 7, which includes all the proxies. We again find that both Ln(NMGR) and UWR remain significant. In terms of economic significance, a one standard deviation increase in Ln(NMGR) leads to a 14.8% (0.40 $\times$ 1.06 $\times$ 35 months) increase in factor-adjusted returns over 35 months (where 0.40 is the standard deviation of Ln(NMGR) in the high-VOL subsample). For UWR, the economic impact is 20.1% over 35 months.

Among low-VOL IPOs in Panel C, the coefficient on Ln(NMGR) is statistically insignificant in each of the models, while that of UWR remains significant. However, even for UWR, the economic magnitude is less among low-VOL IPOs than among high-VOL IPOs. Therefore, these results suggest that the effect of underwriter quality is most important among high-uncertainty IPOs. The coefficient on APA remains insignificant in Panel C.

The coefficient on the first-day return, FDRET, is positive and significant among high-VOL IPOs (Panel B) and insignificant among low-VOL IPOs (Panel C). Even though the coefficient on FDRET is just 0.01 in Panel B, it implies that over 35 months, 35% of the first-day return is extended, an economically substantial momentum effect. Viewing it differently, a one standard deviation increase in FDRET leads to a 10.3% (29.5% $\times$ 0.01 $\times$ 35 months) increase in factor-adjusted returns over 35 months (where 29.5% is the standard deviation of FDRET in the high-VOL subsample). This suggests that the short-run price effect does not hurt long-run IPO performance, and, when uncertainty is high, it helps long-run performance. The coefficient on VOL is statistically insignificant in most of the models across the panels. To the extent that VOL indicates risk, this result suggests that risk does not explain the variations in abnormal long-run returns. In Panel C, firm age is positively associated with long-run performance, consistent with other studies (Ritter, 1991). The coefficient on BUYOUT is insignificant in each specification, suggesting that we are not picking up the positive long-run abnormal returns for the reverse leveraged buyouts found in Cao and Lerner (2009) once we use event-time abnormal returns and control for other variables in a multivariate framework.[17] The coefficient on VENTURE is also insignificant in almost all specifications.

As noted earlier (Table III), there is a significant positive correlation between NMGR and UWR and size (MV). However, the empirical results are distinct from the size effect for several reasons. First, in the multivariate regressions (both the event-time regressions in Table VII and calendar-time regressions discussed below), the abnormal returns are already adjusted for size. Additionally, in unreported portfolio tests, we form bivariate portfolios sorted by NMGR or UWR

[17] We also look at univariate compounded abnormal returns (BHARs) for reverse leveraged buyouts (RLBOs) to verify the Cao and Lerner (2009) finding. We find that RLBOs significantly outperform other IPOs in median over the entire sample period but do not outperform in mean.

and size (MV) and find that keeping the MV category fixed, there is still a significant NMGR (or UWR) effect on three-year returns, especially if returns are value-weighted, but the size effect on returns disappears once the NMGR or UWR level is kept fixed. This finding is consistent with the regression result that once NMGR or UWR is controlled for, size does not have a significant effect on long-run returns. Finally, the effect of size on long-run IPO performance is not stronger among high-uncertainty IPOs than low-uncertainty IPOs.

B. Calendar-Time Return Regressions

In this subsection, we report the calendar-time factor-adjusted performance of high-, medium-, and low-NMGR, UWR, and APA portfolios as well as high minus low NMGR, UWR, and APA hedge portfolios. These tests avoid the autocorrelation problems present in overlapping returns, such as with compounded abnormal returns, and account for cross-correlation among returns across clustered events. However, calendar-time regressions may lack power in detecting significant abnormal returns when negative abnormal returns are more common following high IPO volume (Loughran and Ritter, 2000). Therefore, we provide calendar-time regressions mainly for robustness of our results.

In the calendar-time tests, our sample of IPOs again covers the period from 1980 to 2006, excluding the bubble period IPOs (1999-2000). However, we only begin to examine calendar-time portfolio market performance in 1981 and end in 2008 as we require that enough firms be in each portfolio in order to make reliable inferences. Therefore, we have 336 monthly observations for the calendar-time regressions.[18]

Calendar-time factor-adjusted returns are obtained using Lyandres et al.'s (2008) four-factor regressions involving the monthly calendar-time returns of IPO portfolios. IPOs can remain in the sample for a three-year period after which time they drop out. More specifically, IPOs are assigned to a high-, medium-, or low-NMGR, UWR, or APA monthly portfolio starting the second calendar month after the IPO. The IPOs stay in the sample for up to 35 months, but the portfolios are rebalanced monthly. The factor-adjusted return is the intercept from this regression. We find similar results when we add Carhart's (1997) momentum factor as another factor in unreported tests.

1. Equal-Weighted Portfolios

Table VIII reports the results of the regressions described above, the intercept of which can be interpreted as the factor-adjusted monthly abnormal return for the three years after the offer. Our results indicate that excluding IPOs from 1999 to 2000, IPOs do not underperform on a factor-adjusted basis in equal-weighted results. However, Panel A indicates that over the three-year horizon, low-NMGR IPOs significantly underperform while high-NMGR IPOs do not underperform. Furthermore, the high minus low NMGR hedge portfolio earns a highly significant abnormal return. The magnitude of the underperformance of the low NMGR portfolio relative to the high NMGR portfolio is 32.6% (0.93% $\times$ 35) over three years, which is consistent with the equal-weighted style-adjusted compounded returns in Table IV. In Panel B, we find similar results for UWR. However, in Panel C, we conclude that the high minus low APA hedge portfolio is insignificantly different from zero.

[18] For the portfolios formed in 2000, they include IPOs from 1997 and 1998, but not 1999-2000. For the portfolios formed in 2001, they include IPOs from 1998 and 2001, but not 1999-2000.

Table VIII. Calendar-Time Factor Regression Intercepts for NMGR, UWR, and APA Portfolios

This table reports the results of regressions using Fama and French's (1993) three factors as well as Lyandres et al.'s (2008) investment factor, which involve equal- and value-weighted monthly calendar-time returns of low-, medium-, and high-NMGR, UWR, and APA portfolios. The portfolios are constructed by allocating IPOs to low-, medium-, or high-NMGR/UWR/APA portfolios as they become public. The IPOs remain in their respective portfolios for up to three years after which time they drop out. The regression model is given by: $R_{pt}-R_{ft} = a + b(R_{mt}-R_{ft}) + s\text{SMB}_t + h\text{HML}_t + i\text{INV}_t + e_t$. R_{pt} is the monthly portfolio percentage return. R_{ft} is the one-month Treasury bill percentage return. R_{mt} is the monthly value-weighted return on all NYSE, AMEX, and NASDAQ stocks. SMB_t (small minus big) is the average monthly return on the three small portfolios minus the average return on the three big portfolios. HML_t (high minus low) is the average monthly return on the two value portfolios minus the average return on the two growth portfolios. INV_t is the investment factor from Lyandres et al. (2008). The numbers presented are the portfolio's monthly intercepts in percent. The numbers in parentheses are *t*-statistics. The sample includes IPOs from 1980 to 2006 excluding the bubble period (1999 and 2000). Returns from 1981 and 2008 (336 observations) are used to so there will be sufficient firms in each portfolio.

	Equal Weighted	Value Weighted
Panel A. NMGR Portfolios		
Low NMGR	−0.70***	−0.67***
	(−2.72)	(−2.88)
Mid NMGR	−0.11	−0.13
	(−0.42)	(−0.60)
High NMGR	0.17	0.47**
	(0.94)	(2.32)
High-Low NMGR	0.93***	1.19***
	(4.39)	(3.95)
All IPOs	−0.20	0.29*
	(−1.13)	(1.81)
Panel B. UWR Portfolios		
Low UWR	−0.59**	−0.36*
	(−2.15)	(−1.80)
Mid UWR	−0.13	0.01
	(−0.67)	(0.06)
High UWR	0.16	0.51***
	(0.92)	(2.62)
High-Low UWR	0.75***	0.89***
	(3.63)	(3.56)
All IPOs	−0.16	0.31*
	(−0.89)	(1.88)
Panel C. APA Portfolios		
Low APA	−0.27	0.15
	(−1.30)	(0.90)
Mid APA	−0.12	0.17
	(−0.56)	(0.93)
High APA	−0.21	0.57**
	(−1.05)	(2.38)
High-Low APA	0.05	0.43
	(0.29)	(1.64)
All IPOs	−0.20	0.30*
	(−1.09)	(1.83)

***Significant at the 0.01 level.
**Significant at the 0.05 level.
*Significant at the 0.10 level.

2. Value-Weighted Portfolios

Table VIII also reports calendar-time regression results when returns are value weighted. These results confirm that the underperformance of low-managing-underwriter IPOs relative to high-managing-underwriter IPOs is not just a small IPO effect. In fact, consistent with the portfolio tests in Section III, the abnormal return found for the value-weighted high minus low NMGR hedge portfolio in Panel A is statistically significant, and larger in magnitude than that found for the equal-weighted hedge portfolio. The wealth of an investor purchasing the high minus low NMGR hedge portfolio would therefore increase by 41.7% (1.19% $\times$ 35) over three years. Again, the magnitude of the high minus low NMGR return differential is in line with the value-weighted style-adjusted compounded returns in Table IV. The results are similar for UWR. The high minus low APA hedge portfolio earns, at best, a marginally significant profit (significant at the 10.2% level), although the high-APA portfolio return is statistically significant.

V. Discussion

The main empirical results (outside of the bubble period) of this study can be summarized as follows. First, IPO firms with greater underwriter quality significantly outperform IPO firms with lower underwriter quality. Specifically, IPOs with high underwriter quality earn positive abnormal returns, while IPOs with low underwriter quality earn negative abnormal returns. This confirms the findings of previous studies (Michaely and Shaw, 1994; Carter et al., 1998; Chan et al., 2008). Additionally, the effect of underwriter quality on long-run IPO performance is strongest among IPOs with high uncertainty, as measured by residual volatility. Moreover, in the cross-sectional regression test, the first-day return is positively related to the long-run return when the IPO uncertainty is high. Finally, absolute price adjustment, a purer measure of information production, is insignificant in the cross-sectional and calendar-time long-run return regressions. These empirical findings can be interpreted in light of the three frameworks discussed in Section I: 1) marketing, 2) certification/screening, and 3) information production.

Under the marketing hypothesis, marketing creates investor demand, especially for high-uncertainty (VOL) stocks. As such, the empirical evidence is perfectly compatible with the marketing hypothesis. Result 1, which demonstrates a positive association between underwriter quality and the long-run return, is consistent with the view that marketing boosts the long-run market price more than it boosts the short-run price. IPOs underwritten by weak marketing investment banks may not get the necessary price support or analyst coverage in the aftermarket, thus earning negative future abnormal returns. If investors (especially retail investors) do not fully appreciate the role of marketing in the success of an IPO, they may tend to overpay for poorly marketed IPOs, leading to the persistent underperformance of weakly marketed IPOs. Alternatively, the positive abnormal returns of strongly marketed IPOs are consistent with the view that the issuer and underwriters care more about the long-run success of the IPO, which is sensible when viewed in a repeated game setting. (In the Internet bubble period, underwriters might have had special incentives that distort this long-run focus.) The finding that the effect of underwriter quality is stronger when volatility is high (Result 2) gives further support to the marketing role of underwriters. Marketing is most effective in boosting demand for stocks with a more negatively sloped demand curve. Result 3, that the first-day return (FDRET) is positively related to long-run performance when VOL is high, also supports the idea that when the IPO has high uncertainty, marketing is particularly important and initial price support is crucial for its long-run performance. Finally, our evidence does not support the Chemmanur and Krishnan

(2009) prediction that high-quality underwriters are able to create greater heterogeneity among investors in the valuations and, hence, long-run underperformance for IPOs.

The empirical results are also consistent with the underwriter certification/screening hypothesis. A key assumption with this framework is that high-quality underwriters possess above-average IPO screening skills. For example, prestigious underwriters could be better at certifying and screening IPOs or if fewer analysts are convinced about the merits of an IPO company, the company would have greater difficulty adding comanagers. Furthermore, if investors do not interpret the information content of underwriter reputation and the number of managing underwriters appropriately, then this could explain why NMGR and UWR are positively related to long-run performance (Result 1). The stronger relationship between underwriter quality and long-run performance among high-VOL IPOs (Result 2) may imply that underwriter certification and screening is most important for hard to value IPOs with high uncertainty. The positive correlation between the first-day return and long-run performance when VOL is high (Result 3) may be explained by the underreaction of the market at the time of the offering when the IPO is difficult to value.

According to the information production hypothesis, information produced by investment banks should help reduce overvaluation, especially among high-VOL stocks. As such, the empirical prediction is that high information production should lead to less negative long-run returns, but not positive long-run returns. Based on our results, the information production hypothesis receives little support. First, we find that high-NMGR and high-UWR IPOs earn positive three-year style-adjusted returns (Result 1) in contrast to the information production hypothesis that suggests that high-information-production IPOs should earn zero abnormal returns (i.e., they are fairly priced), while low-information-production IPOs should be overpriced and earn negative abnormal returns. In addition, if one believes that FDRET has a component of initial overvaluation, the positive relationship between FDRET and long-run performance when VOL is high (Result 3) is hard to reconcile with information production. Additionally, to the extent that absolute price adjustment is a purer measure of information production when compared to the number of managing underwriters and underwriter reputation, the finding that APA is insignificant in the cross-sectional and calendar-time regressions (Result 4) suggests that information production does not predict long-run performance.

In sum, our results are consistent with the both the marketing and certification/screening roles of underwriters and the joint hypothesis that the market does not price their efforts appropriately. These roles are not mutually exclusive and can coexist. For example, marketing in the form of direct promotion or analyst coverage should be more effective when the underwriters are attached with strong certification.

Can these findings be consistent with a risk-based explanation? One cannot exclude the possibility that riskier IPOs generally require larger syndicates and reputable underwriters to reduce the risk in selling the shares. However, our results on the whole present a challenge for the risk-based theory. First, if risk is driving the results, and IPOs with greater underwriter quality are riskier, then these firms should have better long-run performance (assuming the risk adjustment for returns is inadequate). However, it is still unclear why this pattern holds primarily among high-VOL firms. Furthermore, stocks with greater underwriter quality proxies have larger market values in Table III, which are generally associated with less risk.[19] Additionally, the results remain robust to value weighting the returns, alleviating the concern of inadequate risk adjustment

[19] Carter and Manaster (1990) argue that more prestigious investment banks are associated with less risky IPOs. The reason is that more reputable investment banks have a bigger stake in reputation, and they choose to underwrite less risky IPOs.

that generally pertains to small IPOs. Moreover, among the low-NMGR or low-UWR firms in Table VI, VOL is negatively related to future three-year returns. This pattern is especially strong for value-weighted returns. For example, in Panel B, the High-Low VOL value-weighted return spread is a substantial, –31.2% among the low-NMGR firms and –38.5% among the low-UWR firms. These findings are hard to reconcile with a risk interpretation.

VI. Conclusion

In this paper, we examine the impact of the number of managing underwriters, underwriter reputation, and information production on the long-run performance of firms that went public from 1980 to 2006. Outside of the Internet bubble period of 1999-2000, the number of managing underwriters and underwriter reputation positively predict long-run IPO performance, especially among firms with high uncertainty. This relationship is robust to various risk adjustment procedures and holds when either equal- or value-weighted long-run returns are used to measure performance. For example, in 2006, the last and most recent year in our sample, IPOs with five or more managing underwriters (the top one-third) have predicted three-year equal-weighted (value-weighted) compounded abnormal returns of 21% (47%) more than IPOs with three or fewer managing underwriters (the bottom one-third) with returns calculated over the 35-month period starting the second calendar month after the IPO. Similarly, IPOs with an underwriter reputation of 8.67 or more have predicted three-year equal-weighted (value-weighted) compounded abnormal returns of 24% (51%) more than IPOs with an underwriter reputation of 7.5 or less. These abnormal returns already control for size and book-to-market effects.

We consider our empirical findings under three frameworks: 1) marketing, 2) certification/screening, and 3) information production. All of these hypotheses are jointly tested with the hypothesis that specific cognitive errors are made on the part of investors. Our findings are consistent with the marketing role of underwriters that investment banks' activities in IPO promotion, market making, price stabilization, and analyst coverage help shift the demand of the stock upward, and underwriter marketing shifts the long-run price more than the short-run price. Alternatively, investment banks' certification and screening function may contribute to the observed patterns. If investors underestimate the importance of certification, they may overpay IPOs with poor underwriter quality leading to the underperformance of these IPOs. Conversely, if IPOs with a good underwriter reputation or a large number of comanagers are prescreened for their secondary market value, these IPOs are more likely to outperform. Finally, our evidence gives little support to the information production hypothesis that underwriters produce useful information in the bookbuilding process to reduce the behavioral biases of investors and the overvaluation of IPOs. ■

References

Aggarwal, R., 2000, "Stabilization Activities by Underwriters after IPOs," *Journal of Finance* 55, 1075-1103.

Barber, B. and T. Odean, 2008, "All that Glitters: The Effect of Attention and News on the Buying Behavior of Individual and Institutional Investors," *Review of Financial Studies* 21, 785-818.

Benveniste, L.M. and P.A. Spindt, 1989, "How Investment Bankers Determine the Offer Price and Allocation of New Issues," *Journal of Financial Economics* 24, 343-361.

Boehme, R., B. Danielsen, P. Kumar, and S. Sorescu, 2009, "Idiosyncratic Risk and the Cross-Section of Stock Returns: Merton (1987) Meets Miller (1977)," *Journal of Financial Markets* 12, 438-468.

Boehme, R., B. Danielsen, and S. Sorescu, 2006, "Short-Sale Constraints, Dispersion of Opinion and Overvaluation," *Journal of Financial and Quantitative Analysis* 41, 455-487.

Booth, J.R. and L. Chua, 1996, "Ownership Dispersion, Costly Information, and IPO Underpricing," *Journal of Financial Economics* 41, 291-310.

Booth, J.R. and R.L. Smith, 1986, "Capital Raising, Underwriting, and the Certification Hypothesis," *Journal of Financial Economics* 15, 261-281.

Bradley, D.J., B.D. Jordan, and J.R. Ritter, 2008, "Analyst Behavior Following IPOs: The 'Bubble Period' Evidence," *Review of Financial Studies* 21, 101-133.

Brav, A., C. Geczy, and P.A. Gompers, 2000, "Is the Abnormal Return Following Equity Issuances Anomalous?" *Journal of Financial Economics* 56, 209-249.

Brav, A. and P.A. Gompers, 1997, "Myth or Reality? The Long-Run Underperformance of Initial Public Offerings: Evidence from Venture Capital and Nonventure Capital-Backed Companies," *Journal of Finance* 52, 1791-1822.

Cao, J. and J. Lerner, 1997, "The Performance of Reverse Leveraged Buyouts," *Journal of Financial Economics* 91, 139-157.

Carhart, M.M., 1997, "On Persistence in Mutual Fund Performance," *Journal of Finance* 52, 57-82.

Carter, R., F. Dark, and A.K. Singh, 1998, "Underwriter Reputation, Initial Returns, and the Long Run Performance of IPO Stocks," *Journal of Finance* 53, 285-311.

Carter, R. and S. Manaster, 1990, "Initial Public Offerings and Underwriter Reputation," *Journal of Finance* 45, 1045-1067.

Chan, K., J.W. Cooney, J. Kim, and A.K. Singh, 2008, "The IPO Derby: Are There Consistent Losers and Winners on This Track?" *Financial Management* 37, 45-79.

Chemmanur, T.J., 1993, "The Pricing of Initial Public Offerings: A Dynamic Model with Information Production," *Journal of Finance* 48, 285-304.

Chemmanur, T.J. and K. Krishnan, 2009, "Heterogeneous Beliefs, Short Sales Constraints, and the Economic Role of the Underwriter in IPOs," Boston College Working Paper.

Chung, K.H. and H. Jo, 1996, "The Impact of Security Analysts' Monitoring and Marketing Roles on the Market Value of Firms," *Journal of Financial and Quantitative Analysis* 31, 493-512.

Cliff, M.T. and D.J. Denis, 2004, "Do Initial Public Offering Firms Purchase Analyst Coverage with Underpricing?" *Journal of Finance* 59, 2871-2901.

Cook, D.O., R. Kieschnick, and R.A. Van Ness, 2006, "On the Marketing of IPOs," *Journal of Financial Economics* 82, 35-61.

Corwin, S.A. and P. Schultz, 2005, "The Role of IPO Underwriting Syndicates: Pricing, Information Production, and Underwriter Competition," *Journal of Finance* 60, 443-486.

Daniel, K.D., D. Hirshleifer, and A. Subrahmanyam, 1998, "Investor Psychology and Security Market Under- and Over-reactions," *Journal of Finance* 53, 1839-1886.

Das, S., R.J. Guo, and H. Zhang, 2006, "Analysts' Selective Coverage and Subsequent Performance of Newly Public Firms," *Journal of Finance* 61, 1159-1189.

Degeorge, F., F. Derrien, and K.L. Womack, 2007, "Analyst Hype in IPOs: Explaining the Popularity of Bookbuilding," *Review of Financial Studies* 20, 1021-1058.

Einhorn, H.J., 1980, "Overconfidence in Judgment," *New Directions for Methodology of Social and Behavioral Science* 4, 1-16.

Ellis, K., R. Michaely, and M. O'Hara, 2000, "When the Underwriter Is the Market Maker: An Examination of Trading in the IPO Aftermarket," *Journal of Finance* 55, 1039-1074.

Fama E.F. and K.R. French, 1993, "Common Risk Factors in the Returns on Stocks and Bonds," *Journal of Financial Economics* 33, 3-56.

Field, L.C. and J. Karpoff, 2002, "Takeover Defenses of IPO Firms," *Journal of Finance* 57, 1857-1889.

Frieder, L. and A. Subrahmanyam, 2005, "Brand Perceptions and the Market for Common Stock," *Journal of Financial and Quantitative Analysis* 40, 57-85.

Gao, X. and J.R. Ritter, 2010, "The Marketing of Seasoned Equity Offerings," *Journal of Financial Economics* 97, 33-52.

Hanley, K.W., 1993, "The Underpricing of Initial Public Offerings and the Partial Adjustment Phenomenon," *Journal of Financial Economics* 34, 231-250.

Hanley, K.W., A.A. Kumar, and P.J. Seguin, 1993, "Price Stabilization in the Market for New Issues," *Journal of Financial Economics* 34, 177-197.

Hirshleifer, D., 2001, "Investor Psychology and Asset Pricing," *Journal of Finance* 64, 1533-1597.

Hoberg, G., 2007, "The Underwriter Persistence Phenomenon," *Journal of Finance* 62, 1169-1206.

Huang, R. and D. Zhang, 2009, "Managing Underwriters and the Marketing of Seasoned Equity Offerings," *Journal of Financial and Quantitative Analysis*, forthcoming.

Ince, O., 2008, "Why Do IPO Offer Prices Only Partially Adjust?" Virginia Tech Working Paper.

James, C. and J. Karceski, 2006, "Strength of Analyst Coverage After IPOs," *Journal of Financial Economics* 82, 1-34.

Kahneman, D., J.L. Knetsch, and R.H. Thaler, 1990, "Experimental Tests of the Endowment Effect and the Coase Theorem," *Journal of Political Economy* 98, 1325-1348.

Loughran, T. and J.R. Ritter, 1995, "The New Issues Puzzle," *Journal of Finance* 50, 23-51.

Loughran, T. and J.R. Ritter, 2000, "Uniformly Least Powerful Test of Market Efficiency," *Journal of Financial Economics* 55, 361-390.

Loughran, T. and J.R. Ritter, 2004, "Why Has IPO Underpricing Changed Over Time?" *Financial Management* 33, 5-37.

Lowry, M., M.S. Officer, and G.W. Schwert, 2010, "The Variability of IPO Initial Returns," *Journal of Finance* 65, 425-465.

Lyandres, E., L. Sun, and L. Zhang, 2008, "The New Issues Puzzle: Testing the Investment-Based Explanation," *Review of Financial Studies* 21, 2825-2855.

Merton, R.C., 1987, "A Simple Model of Capital Market Equilibrium with Incomplete Information," *Journal of Finance* 42, 483-510.

Michaely, R. and W.H. Shaw, 1994, "The Pricing of Initial Public Offerings: Tests of Adverse Selection and Signaling Theories," *Review of Financial Studies* 7, 279-319.

Miller, E.M., 1977, "Risk, Uncertainty, and Divergence of Opinion," *Journal of Finance* 32, 1151-1168.

Purnanandam, A.K. and B. Swaminathan, 2004, "Are IPOs Really Underpriced?" *Review of Financial Studies* 17, 811-848.

Ritter, J.R., 1991, "The Long Run Performance of Initial Public Offerings," *Journal of Finance* 46, 3-27.

Ritter, J.R., 2003, "Investment Banking and Securities Issuance," in G. Constantinides, M. Harris, and R. Stulz, Eds., *Handbook of the Economics of Finance*, Amsterdam, North-Holland.

Ritter, J.R. and I. Welch, 2002, "A Review of IPO Activity, Pricing, and Allocations," *Journal of Finance* 57, 1795-1828.

Tetlock, P.C., 2007, "Giving Content to Investor Sentiment: The Role of Media in the Stock Market," *Journal of Finance* 62, 1139-1168.

Wang, W. and C. Yung, 2009, "IPO Information Aggregation and Underwriter Quality," *Review of Finance*, forthcoming.

Wurgler, J. and E. Zhuravskaya, 2002, "Does Arbitrage Flatten Demand Curves for Stocks?" *Journal of Business* 75, 582-608.

Zhang, D., 2004, "Why Do IPO Underwriters Allocate Extra Shares When They Expect to Buy Them Back?" *Journal of Financial and Quantitative Analysis* 39, 571-594.