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The Underwriter Persistence Phenomenon

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ABSTRACT

This study presents new evidence that initial IPO returns have persistent underwriter-specific components. These components cannot be explained by existing measures of underwriter quality, underwriter service, or controls for several known predictors of initial IPO returns. Tests that trace the roots of persistence most broadly support theories of asymmetric information among underwriters. I present such a model, and consistent with its predictions, I find that high underpricing underwriters (1) are responsible for a majority of the partial adjustment phenomenon, (2) make more informed analyst revisions, (3) experience superior market share growth, and (4) are more likely to serve an institutional clientele.

IN A SAMPLE OF U.S. INITIAL PUBLIC OFFERINGS from 1984 to 2000, the average IPO experiences initial returns of 22.7%. Using quartiles based on underwriter-specific past initial returns, I find that underwriters in the highest quartile bring to market *future* IPOs with 32.1% initial returns, compared to just 17.4% for those in the lowest quartile. This economically large spread of 14.7% is robust to controls for known predictors of initial returns such as size, underwriter prestige, industry, and hot IPO markets. Persistent initial return differences exist for large and small underwriters alike, and are stable in both the 1980s and the 1990s. I refer to this predictable component of initial returns as the "underwriter persistence phenomenon." My study documents this new phenomenon and tests competing explanations for how it arises.

Underwriter persistence is puzzling. The choice of lead underwriter is usually known several months before shares are sold. Hence, underwriters have ample time to change their pricing policies to correct for this anomaly, investors have ample time to act on it, and competitive forces have ample time to eliminate it to the extent it is driven by inefficient markets. Yet, the size of this anomaly has not diminished, but instead has grown in size from the 1980s to the 1990s. Because underwriter persistence is robust to controls for several variables known to predict initial returns, its existence is a mystery given the

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state of today's literature. My evidence suggests that asymmetric information among underwriters is the most likely explanation.

I divide possible explanations for underwriter persistence into two classes: (1) those based on private information and (2) those based on public information. Explanations based on private information must explain why underwriters with heterogeneous information quality experience varying initial returns. I refer to this class of explanations as the "information asymmetry hypothesis." Explanations based on public information must explain why high underpricing underwriters low ball the IPO price, and why these actions are fully visible given public information. I refer to this class of explanations as the "low-balling hypothesis." This dichotomy between public and private information is motivated by a key finding I report: The actions of high (above median) underpricing underwriters explain over 80% of the partial adjustment phenomenon.[1] Hence, underwriter persistence and partial adjustment have common roots, and the growing debate regarding whether partial adjustment is driven by public or private information has direct importance for explaining the underwriter persistence phenomenon.[2]

To test the information asymmetry hypothesis, I first examine whether analysts who work for high and low underpricing underwriters make more informative revisions to their estimates of future earnings. This test is motivated by the likelihood that valuation skill is universally profitable, and can be shared across investment banking divisions. Analysts who work for highly skilled IPO underwriters should make more informed revisions to forecasts of future earnings. This test is especially clean because I base it on analyst revisions to non-IPO firms. Hence, I cleanly link each underwriter's information quality (information asymmetry) to underwriter persistence in a context that is free from the contamination of other IPO theories. In support of information asymmetry, I find that analysts affiliated with high underpricing underwriters do make more informative revisions. My second test is less direct, and examines whether high underpricing underwriters tend to have an institutional or a retail client base. This test is motivated by the possibility that institutional investors may be better information providers than retail investors.[3] Consistent with such a link between information quality and investor clientele, I find that high underpricing underwriters tend to have more institutional clientele.

To test the low-balling hypothesis, I first use the methods of Purnanandam and Swaminathan (2004) to examine whether high underpricing underwriters systematically set their filing date midpoints too low given public information.

[1] Partial adjustment, first documented in Hanley (1993), is the well-known fact that IPOs priced above (below) the initial filing midpoint experience higher (lower) initial returns.

[2] With respect to whether partial adjustment is driven by public or private information, see Lowry and Schwert (2004) (private information dominates), Loughran and Ritter (2002) (some of both), Edelen and Kadlec (2005) (some of both), and Cornelli and Goldreich (2003) (specific evidence of a private information component).

[3] Institutional investors generally buy larger blocks of stock than retail investors, and thus have more incentive to conduct their own internal research. In turn, this can explain why institutions might be better information providers.

This test is motivated by the fact that low-balling requires visible undervaluation early in the IPO process if it can successfully explain both the partial adjustment phenomenon and the underwriter persistence phenomenon. I find no evidence of a link between this form of undervaluation and an underwriter's past level of underpricing. Hence, this test fails to find support for the low-balling hypothesis. Because this general test may lack power, I examine additional predictions made by specific low-balling theories. In particular, I test whether some underwriters systematically underprice more as compensation for (1) better service, (2) greater underwriter prestige, (3) better timing of hot IPO markets, or (4) better industry coverage (i.e., for serving more risky industries). I find no empirical link between underwriter persistence and these characteristics. This lack of either broad or specific evidence in support of low-balling, coupled with the support for information asymmetry, lead me to conclude that information asymmetry among underwriters is the most likely explanation for the underwriter persistence phenomenon.

If underwriter persistence is indeed driven by information asymmetry, it is natural to ask how underwriters might become more informed than their rivals in practice. The asymmetric information hypothesis requires that information asymmetry exist early in the IPO process when underwriters compete for mandates. Only at this time can underwriters use their informational advantage to choose which mandates are worthy of aggressive pursuit. Two key items can explain how information asymmetry arises at this time, and why it might be linked to institutional clientele. The first is premarketing, which is the act of gathering limit orders from institutions to buy a candidate IPO before a mandate is even won. Institutional investors are a natural fit for premarketing because they are less numerous and easier to manage, and they may also be better information providers. Because Cornelli and Goldreich (2003) show that limit order books are highly informative, an underwriter who pre-markets can achieve a long-lasting informational advantage relative to an underwriter who does not pre-market. Second, institutional underwriters may self-select themselves as informed underwriters because they are better positioned to profit from doing so. In particular, institutional underwriters might be more efficient than retail underwriters at extracting quid pro quo rents from their clientele.[4] Retail investors are too numerous, and retail underwriters likely find that managing quid pro quos is too administratively challenging and difficult to enforce.

The theory and evidence I present suggests that high underpricing underwriters may have access to better information. Hence, it is natural to view past underpricing as a measure of underwriter quality. I construct a new quality measure "*UWpremium*", based on past initial returns, and explore its properties. I find that:

- *UWpremium* is the single most important predictor of future initial returns based on information available on the initial filing date.

[4] Institutional clients likely purchase more services more often, and underpricing can induce loyalty or the purchase of additional services. See Fulghieri and Spiegel (1993) for a theory of allocations and Hoberg (2004) for a theory of self-selection.

- *UWpremium* has stable time-series properties, and predicts positive initial returns in both the 1980s and the 1990s. This stands in contrast to existing quality measures including the Carter and Manaster (1990) rank and the lead underwriter's market share, which predict negative initial returns in the 1980s but predict positive initial returns in the 1990s (Beatty and Welch (1996), Loughran and Ritter (2004)).
- Consistent with *UWpremium* being a measure of quality, high *UWpremium* underwriters appear to have superior valuation skill, and large underwriters with high *UWpremium* experience superior market share growth.[5]

These findings are consistent with the view that *UWpremium* is a new measure of underwriter quality, that is, that it contains new information about quality not captured by existing measures. Hence, underwriter quality may be at least two dimensional.

The remainder of this paper is organized as follows. Section I summarizes the existing literature. Section II provides a theoretical framework that organizes and motivates the empirical work to follow. Section III describes the variables and the data, and Section IV presents empirical evidence of initial return predictability. Section V examines the relationship between underwriter persistence and the partial adjustment phenomenon. Section VI examines differences in underwriter market share. Section VII tests for differences in underwriter-specific valuation skills, Section VIII explores the role of underwriter service and clientele, and Section IX concludes.

I. Literature Review

This paper focuses on underwriter-specific effects. A related literature looks at prestige as a way of understanding underwriter influence on the pricing of IPOs. Johnson and Miller (1988), Carter and Manaster (1990), and Megginson and Weiss (1991) construct quantitative measures of underwriter prestige. The Johnson and Miller (1988) and Carter and Manaster (1990) rankings assign higher prestige to underwriters that are listed more prominently on tombstone advertisements. The Megginson and Weiss (1991) measure is based on underwriter market share. These studies link underwriter quality to initial return predictability, and show that high Carter–Manaster rank underwriters experience lower initial returns. However, Beatty and Welch (1996) and Logue et al. (2002) cast doubt on the stability of this finding. Loughran and Ritter (2004) suggest that the changing relationship between prestige and initial returns might be attributed to a growing focus on analyst coverage and spinning during the bull market lasting from mid 1982 to early 2000. In related work, Dunbar (2000) looks at prestige (defined as market share) not as a right-hand side (RHS) variable explaining underpricing, but rather as a left-hand side (LHS) variable of independent interest. I present a new measure of underwriter quality,

[5] Small underwriters, who underwrite just 20% of all IPOs and 8% of IPO dollars, behave in a fashion that is more consistent with Beatty and Ritter (1986).

UWpremium, and further explore its properties in the spirit of Dunbar's work. I find that *UWpremium* positively predicts initial returns in both the 1980s and the 1990s.

A key result that I document in this study is that underwriter persistence is strongly related to the partial adjustment phenomenon, which was first reported by Hanley (1993). The partial adjustment phenomenon is the well-known fact that IPOs priced above (below) the initial filing midpoint experience higher (lower) initial returns. Ritter and Welch (2002), Bradley and Jordan (2002), and others show that this is perhaps the single most important predictor of initial IPO returns. Four recent studies focus on the central question of whether partial adjustment is driven by public information such as market returns or private information held by underwriters. Loughran and Ritter (2002) and Edelen and Kadlec (2005) suggest that both private and public information components exist. Cornelli and Goldreich (2003) provide specific evidence of a private information component: Underwriters partially adjust to information in the limit order book (which is not available to the public). Lowry and Schwert (2004) make the stronger argument that partial adjustment to public information is small, so private information is likely the dominant component. This debate is critical to understanding underwriter persistence because I find that high underpricing underwriters explain roughly 80% of the partial adjustment phenomenon. The existing literature supporting the existence of a private information component is consistent with the information asymmetry hypothesis proposed in my study.

Another strand of literature also considers underwriter information production. Through the lens of Benveniste, Busaba, and Wilhelm (2002), Benveniste et al. (2003) find that underwriters tend to bundle information production to firms issuing IPOs in the same industry. This is explained by underwriters enforcing risk sharing among issuers who might face a free-riding problem. Unlike the authors, who consider underwriting strategies that can span several IPOs, I focus on an underwriter characteristic that can impact the underwriter's pricing on an IPO-by-IPO basis. In support of the above authors' work, I find that industry controls greatly increase R^2 in regressions predicting initial returns, especially in hot IPO markets. I also find that the underwriter persistence phenomenon documented here is unique, as it is robust to controls for both industry and hot IPO markets. Underwriter persistence also remains stable over long periods of time (longer than industry IPO cycles).

Other studies explore whether underwriter services are related to the pricing of IPOs, and pay particular attention to analyst coverage. For example, Krigman, Shaw, and Womack (1999) suggest that issuers may switch underwriters from IPO to SEO to buy analyst coverage. Cliff and Denis (2004) and Loughran and Ritter (2004) suggest that issuers will also accept less proceeds in exchange for analyst coverage.

II. Theory

I present a single-period asymmetric bidding model to motivate the theoretical link between information asymmetry among underwriters and three predictions, namely, (1) informed underwriters are high underpricing underwriters, (2) high underpricing underwriters have larger market shares than low underpricing underwriters, and (3) high underpricing underwriters win a clientele weighted toward more valuable issuers.

The game begins when two heterogeneously informed underwriters (G = informed and U = uninformed) simultaneously bid for the right to issue a single entrepreneur's IPO. The bid prices P_G and P_U are the prices at which G and U are willing to sell the entrepreneur's (E) firm to the public. After observing the bid prices, E chooses G or U as lead underwriter. Consistent with the observed IPO mechanism, third-party investors then buy the firm from the winning underwriter at the same price (P_G or P_U) paid to the issuer, and profits are realized. As in Loughran and Ritter (2002), I assume that underwriter profits are linked to the first-day returns realized by these third-party investors.

A. Information Structure

At the start of the game, nature chooses E's type $\tilde{\mu}$ to be zero or one with equal probability. Based on the outcome, the true value of E's firm is $V + \tilde{\mu}\sigma$, where V is a scaling parameter for the size of E's firm, and σ indicates the level of price uncertainty in the economy. Thus, the true value of E's firm is high or low when $\tilde{\mu}$ is one or zero, respectively. I assume that E knows his own type. Being informed, underwriter G also knows the value of $\tilde{\mu}$. Underwriter U is uninformed and does not know the value of $\tilde{\mu}$. Informational asymmetry is the only asymmetry I assume regarding G and U.

B. The Entrepreneur's Choice

After observing the bid prices P_G and P_U, the entrepreneur chooses G or U as lead underwriter. The chosen underwriter then sells the issue to the public at the corresponding price P_G or P_U. Consistent with Arkebauer and Schultz (1991), who suggest that underwriting products are differentiated and underwriters appear to compete in small oligopolies, I assume that G and U compete on the basis of price in an imperfectly competitive market. To model imperfect price competition, I assume that E's decision rule is subject to noise ($\tilde{s}$) as follows:[6]

$$\text{E chooses G} \quad \text{if } P_G - P_U \geq \tilde{s}, \quad \text{E chooses U otherwise.} \tag{1}$$

The random variable $\tilde{s}$ is not known by G and U, and is uniformly distributed over the closed interval $[-\frac{S}{2}, +\frac{S}{2}]$, where S is a parameter indicating how noisy E's decision rule is, and thus how imperfect competition is. Intuitively, as S goes to zero, the bidding game approaches Bertrand competition, in which very small changes in bid prices can steal the mandate with certainty. As S increases,

[6] Hoberg (2004) shows that E's noisy decision rule can arise from an unobservable characteristic of E's utility function, indicating E's preference for differentiated underwriting products. Hence, this form of imperfect competition can arise from standard preferences.

competition becomes less perfect because small changes in bid prices will have little impact on E's decision. The noise associated with E's decision rule has a symmetric impact on G and U, as the distribution of $\tilde{s}$ is centered around zero (again, informational asymmetry is the only asymmetry I assume regarding G and U).

After taking expectations over the uniform distribution of $\tilde{s}$, E's decision rule gives the following selection probabilities:[7]

$$\Pr[\text{G wins} \mid P_G, P_U] = \frac{1}{2} + \frac{P_G - P_U}{S}, \quad \Pr[\text{U wins} \mid P_G, P_U] = \frac{1}{2} + \frac{P_U - P_G}{S}. \tag{2}$$

C. Underwriter Objectives

As in Loughran and Ritter (2002), I assume that underwriters profit by selling underpriced shares and extracting a portion of the resulting investment returns from IPO investors. In particular, an underwriter's total profit is equal to a fraction of the underpricing he generates, where underpricing is the spread between the firm's fundamental value ($V + \sigma\tilde{\mu}$) and its IPO price. Underwriter G's profit function can thus be written as follows (U's profit function is similarly defined):

$$\tilde{\pi}_G = \gamma(V + \sigma\tilde{\mu} - P_G) \quad \text{if G wins the mandate,} \quad \tilde{\pi}_G = 0 \text{ otherwise.} \tag{3}$$

The parameter γ indicates the level of institutional friction that IPO underwriters face. A value less than one is consistent with traditional book building models following Benveniste and Spindt (1989) and Sherman and Titman (2002), in which investors require compensation for information production, leaving less profits for underwriters. A value closer to one is more consistent with a model (see Maksimovic and Pichler (2002)) in which investors require little or no compensation. Ritter and Welch (2002) suggest that underpricing may be too large to be explained by book building alone, so this feature of the model is important. I show that equilibrium strategies do not depend on the value of γ, so my model's predictions are consistent with either view.

I assume that both underwriters are risk neutral, so they maximize expected profit. Because they can only profit when they win the mandate, the rules of expectations imply that G's expected profit $E[\tilde{\pi}_G]$ can be written as

$$E[\tilde{\pi}_G] = \sum_{x\in 0,1} \Pr[\tilde{\mu} = x]\Pr[\text{G wins} \mid \tilde{\mu} = x]E[\tilde{\pi}_G \mid \text{G wins}, \tilde{\mu} = x]. \tag{4}$$

Because G is informed and knows the value of $\tilde{\mu}$, he can condition his IPO price on its outcome. I use the notation $P_{G,H}$ and $P_{G,L}$ to denote the bid prices made by G when he observes that $\tilde{\mu}$ is one and zero, respectively. Equations (2) and (4) can then be used to write G's objective as follows:

[7] The derivation assumes that S is sufficiently large (E's decision is sufficiently noisy) such that $abs(P_U - P_G) \leq \frac{S}{2}$. See the Appendix for details.

$$\underset{P_{G,H}}{\text{MAX}}\left(\frac{1}{2}+\frac{P_{G,H}-P_U}{S}\right)\gamma(V+\sigma-P_{G,H}) \quad \text{if } \tilde{\mu}=1 \tag{5}$$
$$\underset{P_{G,L}}{\text{MAX}}\left(\frac{1}{2}+\frac{P_{G,L}-P_U}{S}\right)\gamma(V-P_{G,L}) \quad \text{if } \tilde{\mu}=0.$$

Because U is uninformed, he cannot condition his bid on the value of $\tilde{\mu}$, and his only pure strategy is to submit a deterministic bid, which I denote as P_U.[8] Equations analogous to (2) and (4) can then be used to write U's objective as follows:[9]

$$\underset{P_U}{\text{MAX}}\,\frac{1}{2}\left(\frac{1}{2}+\frac{P_U-P_{G,H}}{S}\right)\gamma(V+\sigma-P_U)+\frac{1}{2}\left(\frac{1}{2}+\frac{P_U-P_{G,L}}{S}\right)\gamma(V-P_U). \tag{6}$$

D. Equilibrium

The objectives in equations (5) and (6) are quadratic in the bid prices $P_{G,H}$, $P_{G,L}$, and P_U. In the Appendix, I prove the following proposition:

PROPOSITION 1: *Suppose all parameters are positive and suppose further that the following condition holds: $\sigma \leq \sqrt{2}S$. Then the unique subgame perfect Nash equilibrium in the competitive underwriting game is*

$$P^*_{G,H}=V-\frac{S}{2}+\frac{3\sigma}{4},\quad P^*_{G,L}=V-\frac{S}{2}+\frac{\sigma}{4},\quad P^*_U=V-\frac{S}{2}+\frac{\sigma}{2}. \tag{7}$$

The condition on σ ensures that U wins both high and low value mandates with positive probability. If the condition is violated, no subgame perfect Nash equilibria exist, as G is willing to price high value mandates aggressively, which drives U's probability of winning these mandates to zero. However, if G knows that U's probability of winning such mandates is indeed zero, he will bid an arbitrarily low price, which violates the required best response conditions for Nash equilibria.[10]

When $\sigma = 0$, both underwriters are identically informed and bid the same IPO price. Otherwise, G bids more aggressively when $\tilde{\mu} = 1$ because he can extract a larger portion of the firm's higher value. U is unable to identify when E's firm has a higher valuation, and cannot effectively compete for these information rents. I now present the model's implications.

[8] Using the fact that G and U's objectives are quadratic in their own strategies, but linear in their rival's strategy, it can be shown that no mixed strategy equilibria exist.

[9] The objectives written for G and U in equations (5) and (6) assume that the expression for the selection probability in equation (2) lies in the interval (0,1). See the Appendix for more details.

[10] Equilibrium nonexistence for extreme values of σ mainly arises from the limited support and discontinuous nature of the uniform density function. Advanced distributional assumptions can eliminate the condition in Proposition 1, but add considerable complexity with little new intuition. Equilibrium existence can also be restored if E has the option to abandon the IPO market when prices are low (see Hoberg (2004)).

IMPLICATION 1: *IPOs with G as lead underwriter experience more underpricing than those with U as lead underwriter. Letting $\tilde{Z}$ denote observed underpricing $(V + \sigma\tilde{\mu} - P_{ipo})$, the proof obtains from the following difference of expectations:*[11]

$$E[\tilde{Z} \mid \text{G wins}] - E[\tilde{Z} \mid \text{U wins}] = \frac{3\sigma^2}{8S}. \tag{8}$$

IMPLICATION 2: *Underwriter G attracts more high value entrepreneurs than underwriter U. The proof obtains from the following result:*

$$\Pr[\text{E has high value} \mid \text{G wins}] - \Pr[\text{E has high value} \mid \text{U wins}] = \frac{\sigma}{2S}. \tag{9}$$

The existing literature links this implication to the partial adjustment phenomenon, which is Hanley's (1993) well-known result that IPOs that are most valuable ex post (high underpricing) experience upward revisions to the IPO price (relative to the filing date midpoint) before being sold.[12] Because G secures more mandates that are ex post more valuable (Implication 2), G should be responsible for more of the partial adjustment phenomenon than U.

IMPLICATION 3: *Underwriter G will capture a larger dollar market share of the underwriting market than U. Letting M_G and M_U denote G and U's dollar market share, respectively, the proof obtains from the following result:*[13]

$$M_G - M_U = \frac{\sigma^2}{8S}. \tag{10}$$

The model's central result is that underwriter G uses his informational advantage to win high value mandates, and he then extracts rents by only partially increasing his bid to reflect the higher valuation. This lethargic pricing links underwriter information quality to higher initial returns, and to the partial adjustment phenomenon.

III. Empirical Setup

A. Data

IPO data are from the Securities Data Company (SDC) U.S. New Issues Database. The sample initially consists of all U.S. IPOs issued between January 1, 1980 and December 31, 2000. I eliminate ADRs, unit issues, REITs, financial firms, and firms with offer prices less than 5 dollars. Observations

[11] To prove all three implications, I take expectations over the relevant outcomes of $\tilde{\mu}$ given the equilibrium strategies in Proposition 1.

[12] As discussed, Lowry and Schwert (2004) and others support the notion that price adjustments have a component linked to nonpublic information.

[13] I define an underwriter's dollar market share as the expected dollar value of the issue proceeds that he underwrites. G use dollar market share to be consistent with Megginson and Weiss (1991), who establish dollar underwriter market share as a measure of underwriting quality.

satisfying either of the following two conditions are only used to compute stable starting values for *UWpremium* and are otherwise excluded: (1) IPOs issued in the first 4 years, that is 1980–1983, and (2) IPOs underwritten by a lead underwriter who has completed fewer than 10 past IPOs.[14] Because the number of past IPOs is public information, no statistical bias is introduced by these exclusions. Furthermore, the second exclusion allows me to focus on the most active underwriters, who play the most important role in the economy. This procedure yields 3,950 observations for 1984–2000.

I combine the I/B/E/S database with the SDC database to examine the information content of revisions to forecasted earnings made by analysts who work for underwriters with varying levels of underwriting quality. First, I extract all observed analyst-specific revisions to 1-year earnings forecasts. Importantly, I only include revisions that (1) are associated with the same fiscal year as the initial estimate, (2) have a valid link to Thomson SDC data, (3) are made regarding firms that are at least 3 years past their IPO date, and (4) were made in 1987 or later because the I/B/E/S database is incomplete in prior years.

B. Underwriter Past Initial Returns

The following two return variables are common in the existing literature.

$$\Delta P = \frac{P_{\text{ipo}} - P_{\text{mid}}}{P_{\text{mid}}}, \qquad IR = \frac{P_{\text{mkt}} - P_{\text{ipo}}}{P_{\text{ipo}}}. \tag{11}$$

P_{mid}, P_{ipo}, and P_{mkt} are the filing date midpoint, the IPO price, and the aftermarket trading price, respectively. ΔP is underwriter's price adjustment from the filing date to the IPO date, and *IR* (initial return) is the market's price adjustment from P_{ipo} to P_{mkt}. Investors who purchase shares at the IPO price P_{ipo} can realize returns equal to *IR* by selling their shares at the closing price on the first day of public trading.

Consider an underwriter J who has issued N IPOs over the past 5 years, and who is about to file for his $(N + 1)$th IPO. $IR_{J,1}, \ldots, IR_{J,N}$ denote the initial returns of his N past IPOs. $IRmkt_{J,1}, \ldots, IRmkt_{J,N}$ denote the market-wide average initial returns for all IPOs issued in the same calendar month as each IPO. I define past underwriter-specific initial returns (*UWpremium*) as the 5-year average:

$$UWpremium_{J,N} = \frac{\sum_{n=1}^{N}(IR_{J,n} - IRmkt_{J,n})}{N}. \tag{12}$$

The numerator is a sum of abnormal initial returns, which are actual initial returns less market-wide averages in the same period. I account for mergers as follows: First, a post-merger underwriter's *UWpremium* is based on IPOs sold

[14] Similar results obtain when this cutoff is placed at 15 or 20 IPOs. Results are also similar, but noisier, for a cutoff based on 5 IPOs.

by either the pre-merger firm, or the post-merger firm itself in the past 5 years. Second, a pre-merger underwriter's *UWpremium* is based only on its own past IPOs.[15]

C. Control Variables

I include controls for the following set of variables, which are well-known predictors of initial IPO returns:

$\Delta P+$ ($\Delta P-$): Positive (negative) price adjustment, max[ΔP, 0] (min[ΔP, 0]); $\Delta P+$ and $\Delta P-$ model the partial adjustment phenomenon, which Hanley (1993) first documents. Lowry and Schwert (2002) first use this relative form.

UWshare: Equity market share of the lead underwriter in the previous calendar year. Megginson and Weiss (1991) first use this measure of underwriter quality.

CMrank: Carter Manaster rank from Carter, Dark, and Singh (1998), and updated in Loughran and Ritter (2004). Carter and Manaster (1990) first use this measure of underwriter quality.

Overhang: Shares retained by the entrepreneur (for all classes) divided by shares filed (including primary and secondary shares). Bradley and Jordan (2002) first document the importance of this measure.

VC: Dummy variable equal to unity if the firm is venture capital-backed, and zero otherwise. Barry et al. (1990) were among the first to study the role of venture capital firms in IPOs.

*PriorIR*30: Average initial return of IPOs issued in the 30 days before the issue date. Ibbotson and Jaffe (1975) first document autocorrelation in monthly average initial returns.

*Mkt*15: NASDAQ return for the 15-trading days preceding the issue date. Logue (1973) first examines whether past market returns can predict future underpricing.

InvPrice: A proxy for issuer risk, equal to the reciprocal of the filing midpoint P_{mid}. Tinic (1988) first uses this measure of risk.

LogSize: Natural logarithm of the original filing amount.

D. Descriptive Statistics

Table I displays summary statistics and shows that for the 3,950 IPOs that remain in the sample from 1984 to 2000, average initial returns are 22.7%. The standard deviation of initial returns is 48.8%, and the standard deviation of the underwriter's price adjustment ΔP is 24.3%. These results roughly match those of existing studies using the same sample period. *UWpremium*'s standard deviation of 4.8% indicates that underwriters experience economically relevant differences in their past initial returns. Its zero mean results from

[15] Underwriter mergers are identified in Ljungqvist, Marston, and Wilhelm (2006).

Table I

Summary Statistics

Summary statistics are reported for IPOs issued in the United State from 1984 to 2000, excluding firms with an issue price less than 5 dollars, ADRs, financial firms, and REITs. IPOs issued from 1980 to 1983 and those lead underwritten by an underwriter who has managed fewer than 10 IPOs are used only to compute stable starting values for *UWpremium* and are otherwise excluded. ΔP is the implied return from the filing date midpoint to the IPO price and is the underwriter's price adjustment. *IR* is the implied return from the IPO price to the aftermarket trading price and is the market driven price correction. For a given IPO, *UWpremium* is equal to the lead underwriter's average past abnormal initial return. Abnormal initial returns are actual initial returns less market-wide average initial returns in the same month. This average includes all IPOs issued by the given underwriter in the 5 years preceding the filing date of the given IPO. *CMrank* is the Carter–Manaster rank as listed in Carter et al. (1998) and updated in Loughran and Ritter (2004). *UWshare* is the lead underwriter's equity market share computed over the previous calendar year. *Overhang* is equal to the pre-IPO shares retained by the issuer divided by the shares filed, both primary and secondary. *InvPrice* is the reciprocal of the filing date midpoint. *LogSize* is the natural logarithm of the original filing amount. *VC* is a dummy that is equal to one if the firm is VC-backed. $\Delta P+$ and $\Delta P-$ are the positive and negative truncated components of ΔP (explained above). *Mkt*15 is the cumulative NASDAQ return over the 15-trading days prior to the issue date. *PriorIR*30 is the average underpricing for all IPOs issued in the 30-day window preceding the issue date. See Purnanandam and Swaminathan (2004) for details regarding the EBITDA, sales, and earnings PV ratios. For example, the numerator of the *EBITDA PV* ratio is the IPO's filing date midpoint times its first recorded shares outstanding in CRSP, all divided by the IPO's COMPUSTAT EBITDA from the fiscal year ending at least 3 months before its IPO date. The denominator is this same quantity for an existing "matched firm," where the filing midpoint is replaced by the firm's CRSP market price. Matched firms are in the same Fama–French 48 industry as the IPO firm, and are then chosen by sorting firms into three sales groups, and then into three EBITDA to sales ratio groups. When a given 1-year earnings forecast is revised, the *normalized analyst revision* is the nominal change in forecasted earnings per share, divided by the stock price prevailing in the prior month.

Variable	Description	Mean	Standard Deviation	Minimum	Median	Maximum	Number of Observations
		Price Variables					
IR	Initial returns	0.227	0.488	−0.328	0.078	6.975	3,950
ΔP	% Price adjustment from P_{mid} to P_{ipo}	0.020	0.243	−0.677	0.000	2.200	3,950
		Explanatory Variables					
UWpremium	Lead underwriter's past abnormal *IR*	0.001	0.048	−0.304	−0.005	0.198	3,950
CMrank	Lead underwriter's Carter–Manaster rank	7.902	1.386	1.000	8.000	9.000	3,950
UWshare	Lead underwriter's equity market share	0.048	0.060	0.000	0.026	0.435	3,950
Overhang	Shares retained / shares filed	3.086	2.126	0.000	2.558	31.692	3,950
InvPrice	One divided by the offer price	0.084	0.027	0.011	0.080	0.250	3,950
LogSize	Natural logarithm of filing amount	17.490	0.950	14.691	17.384	22.174	3,950
VC	Dummy = one if venture capital backed	0.463	0.499	0.000	0.000	1.000	3,950
$\Delta P+$	Positive truncated component of ΔP	0.094	0.180	0.000	0.000	2.200	3,950
$\Delta P-$	Negative truncated component of ΔP	−0.075	0.114	−0.677	0.000	0.000	3,950
*Mkt*15	NASDAQ returns 15 days before IPO date	0.011	0.048	−0.219	0.013	0.250	3,950
*PriorIR*30	Average *IR* 30 days before IPO date	0.236	0.285	−0.028	0.143	4.735	3,950
		Filing Midpoint Valuation and Analyst Revisions					
EBITDA PV ratio	Log one plus EBITDA PV ratio	1.161	0.874	0.001	0.959	7.490	2,323
Sales *PV* ratio	Log one plus sales PV ratio	1.154	0.728	0.001	1.024	6.549	2,323
Earn *PV* ratio	Log one plus earnings based PV ratio	1.188	0.870	0.001	0.981	7.285	1,597
Norm. Revision	Normalized analyst revision	−0.002	0.009	0.045	0.000	0.045	268,654

its construction based on abnormal initial returns. The relatively high average Carter–Manaster rank of 7.9 results because reputable underwriters transact more IPOs (reported averages are transaction weighted), and as noted, IPOs issued by inexperienced underwriters are excluded.

Table II summarizes quality rankings for lead underwriters who sold at least 15 IPOs between 1980 and 1997. The table shows that even prestigious underwriters experience heterogeneous levels of *UWpremium*. For example, Morgan Stanley and Goldman Sachs have high levels of *UWpremium* equal to 4.2 and 4.1, respectively. CS First Boston, Lehman Brothers, and Salomon Brothers have low *UWpremium* levels of −4.0, −5.0, and −5.8, respectively. All five have the highest Carter–Manaster rank of nine, and are among the most famous underwriters. *UWpremium* has a clean interpretation, as it indicates how large an underwriter's initial returns are relative to market averages. For example, Morgan Stanley has initial returns that are 9.2% (4.2 + 5.0) larger than Lehman Brothers, on average. This difference is economically large.

E. Time Series

The time-series properties of *UWpremium* are rather straightforward: Underwriters who underprice more than average will continue to do so. This relationship is strongest for larger, more active underwriters. For example, 59% of the average underwriter's abnormal initial returns are expected to continue from one disjoint 5-year interval to the next.[16] For underwriters with above median market shares, this percentage jumps to 126%. For example, a large underwriter that underprices 10% more than average in one 5-year interval will underprice 12.6% more than average in the next interval. Because these computations are based on abnormal initial returns (not raw initial returns), they cannot be explained by the observed market-wide increase in average initial returns.

Among more active underwriters, I find that underwriters rarely flip between high and low underpricing status. One material exception is that of Credit Suisse First Boston (CSFB) in the late 1990s. Prior to 1997, CSFB was among the lowest underpricing underwriters; by 1999, remarkably it had become one of the highest underpricing underwriters in the sample.

F. Underwriter Quality

Table III summarizes IPO characteristics versus underwriter quality from 1984 to 1997.[17] Panel A shows that initial returns increase monotonically with

[16] This result is statistically significant, and is the cross-sectional average of underwriter-specific time-series AR(1) regression coefficients of average abnormal initial returns over the four disjoint intervals 1980–1984, 1985–1989, 1990–1994, and 1995–1999.

[17] Most results roughly double in magnitude when 1998–2000 are included in the sample. In addition, due to a growing correlation between *UWpremium* and *UWshare* (see Section VI), *UWshare* shows a slight ability to sort residual initial returns in the extended sample.

Table II

Underwriters Who Have Completed at Least 15 IPOs from 1980 to 1997

Underwriter characteristics are based on IPOs issued in the U.S. from 1980 to 1997, excluding firms with an issue price less than 5 dollars, ADRs, financial firms, and REITs. An underwriter is included in the table if it has lead underwritten at least 15 IPOs from 1980 to 1997 after these exclusions. For a given underwriter, *UWpremium* is his average percentage past abnormal initial return over all IPOs lead underwritten by him. Abnormal initial returns are actual initial returns less market-wide average initial returns in the same month. *UWpremium* is expressed as a percentage. *CMrank* is the Carter–Manaster rank as listed in Carter et al. (1998) and updated in Loughran and Ritter (2004). Market share is the given underwriter's percentage equity market share computed over the 1980–1997 sample period. Average IPO size is the average filing amount in millions of dollars for all IPOs lead underwritten by the given underwriter.

Underwriter	*UW-premium*	*CMrank*	Market Share	Average IPO Size	Number of IPOs
D. H. Blair	11.1	3	0.2	4.6	49
Laidlaw Adams and Peck	6.0	6	0.1	6.6	15
William Blair	5.6	7	0.9	26.3	72
HJ Meyers	5.0	1	0.1	10.6	16
Morgan Stanley	4.2	9	11.0	105.8	195
Goldman Sachs	4.1	9	18.2	158.3	206
Alex Brown	4.0	8	5.2	30.8	279
Montgomery	3.9	8	2.3	33.3	163
Robertson Colman	3.5	8	2.2	33.7	134
Hambrecht and Quist	2.6	8	2.0	25.9	140
Piper Jaffray	2.3	7	0.4	25.5	33
Furman Selz	1.3	7	0.2	33.0	16
Ladenburg Thalmann	1.1	6	0.3	14.2	35
Dain Bosworth	0.3	7	0.2	18.8	23
Merrill Lynch	−0.0	9	8.2	93.2	154
Whale Securities	−0.4	2	0.1	7.9	28
LF Rothschild	−0.5	7	2.8	26.0	57
Allen	−1.1	4	0.3	30.2	16
Advest	−1.2	6	0.2	11.0	32
EF Hutton	−1.4	8	0.5	19.4	21
Cruttenden Roth	−1.5	3	0.1	16.1	17
Dean Witter	−2.1	8	1.5	37.8	50
Donaldson Lufkin and Jenrette	−2.2	9	5.1	70.8	151
Raymond James	−2.3	7	0.2	30.4	26
Cowen	−2.5	7	0.4	31.3	30
Kidder Peabody	−2.8	8	2.4	34.6	91
Smith Barney	−2.9	8	4.6	58.4	137
Robinson Humphrey	−3.0	6	0.6	22.1	46
Bear Stearns	−3.2	8	2.1	47.0	80
Volpe Welty	−3.4	7	0.1	28.7	15
PaineWebber	−3.4	8	1.5	36.9	82
Oppenheimer	−3.6	8	0.6	30.9	46
Prudential Bache	−3.9	6	2.2	31.2	96
JC Bradford	−4.0	7	0.3	21.1	31
CS First Boston	−4.0	9	5.6	106.4	105
Drexel Burnham Lambert	−4.2	8	3.2	34.5	83
Lehman Brothers	−5.0	9	4.8	77.4	127
Rauscher Pierce Refsnes	−5.4	7	0.1	19.7	19
AG Edwards	−5.7	7	0.2	26.0	21
Salomon Brothers	−5.8	9	4.6	98.8	81
Dillon Read	−7.5	8	0.6	54.4	34

increasing *UWpremium* from 7.5% to 16.0%. This 8.5% difference is economically large. The three size- and industry-adjusted columns (*IR*, ΔP, and underwriting commission) display each variable's average residuals from ordinary least squares (OLS) regressions as follows:

$$
\begin{aligned}
IR &= \beta_1 LogSize + \beta_2 LogSize^2 + [\text{F-F 48 industry fixed effects}] + \tilde{\epsilon} \\
\Delta P &= \beta_1 LogSize + \beta_2 LogSize^2 + [\text{F-F 48 industry fixed effects}] + \tilde{\epsilon} \\
\text{Commission} &= \beta_1 LogSize + \beta_2 LogSize^2 + [\text{F-F 48 industry fixed effects}] + \tilde{\epsilon}.
\end{aligned} \tag{13}
$$

Size- and industry-adjusted initial returns still increase monotonically from −3.8% to 3.3% versus increasing *UWpremium*. This 7.1% difference is similar in size to the unadjusted difference of 8.5%.[18] Panels B and C show that underwriter market share and the Carter–Manaster rank also have some ability to sort raw initial returns. However, neither sorts size- and industry-adjusted initial returns monotonically.

Because Table III shows that the Carter–Manaster rank and the lead underwriter's market share are positively related to issuer size, I conclude that more prestigious underwriters attract larger issuers than less prestigious underwriters. This result supports the findings of Fernando, Gatchev, and Spindt (2005). *UWpremium* is generally unrelated to issuer size, and instead is more related to the underwriter's price adjustment, ΔP. Although some quality measures show a weak ability to sort raw underwriting commission, size- and industry-adjusted commissions are unrelated to underwriting quality. Hence, variation in *UWpremium* likely cannot be explained by variation in underwriting commissions.

IV. Initial Returns

Figure 1 provides basic intuition for the relationship between underwriter quality (*UWpremium*) and initial return predictability. The figure displays scatter plots of initial returns (*IR*) versus price adjustments (ΔP) for Morgan Stanley (195 IPOs) and Lehman Brothers (127 IPOs) from 1984 to 1997. Both underwriters have the highest Carter–Manaster rank (*CMrank*) of nine, confirming that *CMrank* cannot explain the differences between them. In contrast, Morgan Stanley has a high *UWpremium* of +4.2% compared to Lehman's −5.0%. The partial adjustment phenomenon can be observed in the figure by noting that (1) IPOs to the left of the vertical bar experience initial returns that are close to zero, consistent with underwriters fully adjusting to negative information, and (2) IPOs to the right of the vertical bar experience positive initial returns, consistent with underwriters only partially adjusting to positive information. By comparing Morgan Stanley to Lehman Brothers, the figure provides some intuition for the link between underwriter persistence and the partial adjustment

[18] Similar results obtain for industry effects based on two-digit or three-digit SIC codes. I use the Fama–French 48 throughout this study to preserve degrees of freedom.

Table III

IPO Characteristics versus Underwriter Quality Quartiles

Mean characteristics are reported for IPOs issued in the United State from 1984 to 1997, excluding firms with an issue price less than 5 dollars, ADRs, financial firms, and REITs. IPOs issued from 1980 to 1983 and those lead underwritten by an underwriter who has managed fewer than 10 IPOs are used only to compute stable starting values for *UWpremium* and are otherwise excluded. Within each calendar year, IPOs are grouped into quartiles based on the quality of the lead underwriter. Quality is measured using *UWpremium*, *CMrank*, and *UWshare* for Panels A, B, and C, respectively. The reported characteristics are equal-weighted averages over all observations grouped into each quartile. ΔP is the implied return from the filing date midpoint to the IPO price and is the underwriter's price adjustment. *IR* is the implied return from the IPO price to the aftermarket trading price and is the market driven price correction. For a given IPO, *UWpremium* is equal to the lead underwriter's average past abnormal initial return. Abnormal initial returns are actual initial returns less market-wide average initial returns in the same month. This average includes all IPOs issued by the given underwriter in the 5 years preceding filing date of the given IPO. *UWpremium* is expressed as a percentage. *CMrank* is the Carter–Manaster rank as listed in Carter et al. (1998) and updated in Loughran and Ritter (2004). *UWshare* is the lead underwriter's percentage market share computed over the previous calendar year. Issuer size is the issuer's original filing amount in millions. Underwriting Commission is the underwriter's percentage commission rate. Residual *IR*, Residual ΔP, and Residual Underwriting Commission control each given variable for size and industry effects. Each is computed as the residuals from the following OLS regression equation, replacing "variable" with *IR*, ΔP, and Underwriting Commission, respectively:

$$\text{variable} = \beta_1\, LogSize + \beta_2 LogSize^2 + [\text{Fama–French 48 industry fixed effects}] + \tilde{\epsilon}.$$

	Raw Variables			Size + Industry Adjusted Variables*				
Quartile	*IR*	ΔP	Underwriting Commission	*IR*	ΔP	Underwriting Commission	IPO Size (millions)	Number of Observations
			Panel A: *UWpremium* Quartiles					
Lowest *UWpremium*	7.5	−5.7	6.7	−3.8	−3.8	−0.2	61.6	761
Quartile 2	9.9	−2.9	6.9	−1.8	−1.4	0.0	60.8	772
Quartile 3	14.9	1.1	6.9	2.2	1.6	0.1	62.7	774
Highest *UWpremium*	16.0	2.7	7.2	3.3	3.6	0.1	41.9	766
			Panel B: *CMrank* Quartiles					
Lowest *CMrank*	10.9	−3.8	7.5	0.7	−0.6	0.1	22.2	763
Quartile 2	12.7	−0.2	7.0	−0.1	0.7	−0.0	36.4	769
Quartile 3	10.7	−1.9	6.9	−1.6	−1.0	0.0	57.6	776
Highest *CMrank*	14.0	1.2	6.5	1.0	0.9	−0.1	110.8	765
			Panel C: *UWshare* Quartiles					
Lowest *UWshare*	10.0	−4.0	7.4	0.1	−0.7	0.1	28.8	775
Quartile 2	11.0	−1.9	7.0	−1.6	−1.0	−0.1	49.0	751
Quartile 3	12.2	−0.6	6.9	−0.4	0.1	0.0	54.6	795
Highest *UWshare*	15.2	1.8	6.6	2.2	1.6	−0.0	95.7	752

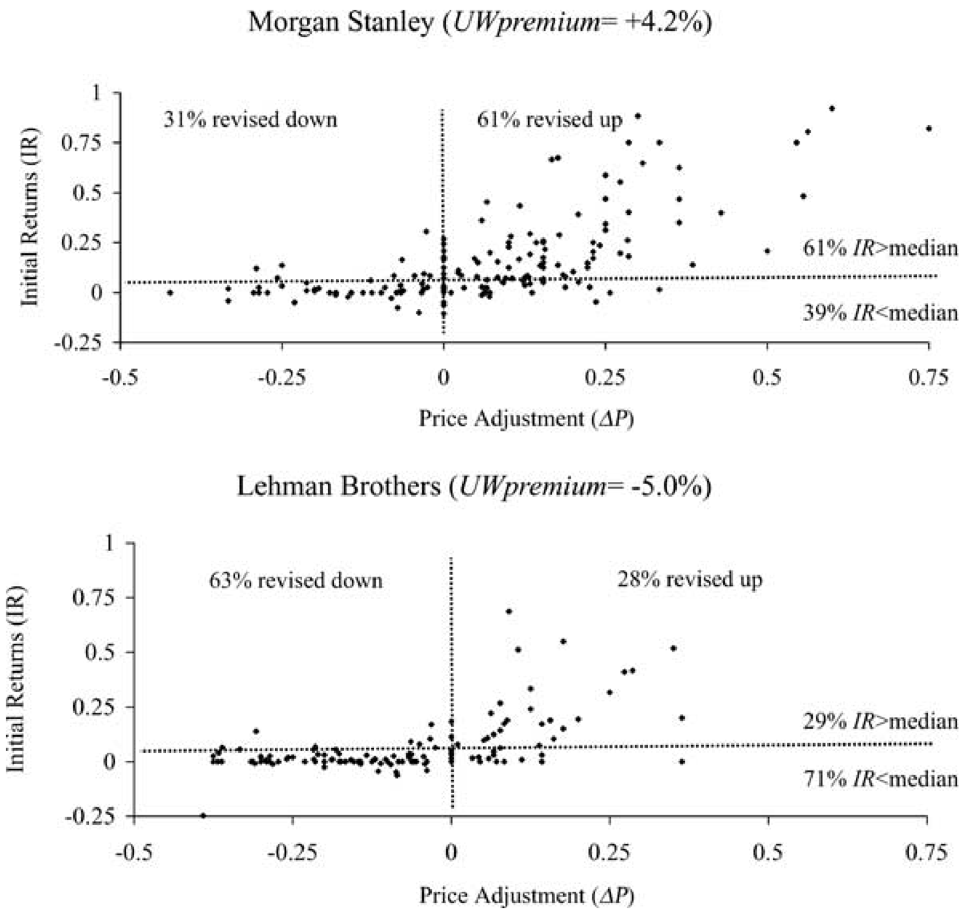

Figure 1. Initial returns versus price adjustment. The figures display scatter plots of initial returns versus price adjustment for Morgan Stanley (195 IPOs) and Lehman Brothers (127 IPOs) from 1984 to 1997. Both underwriters have the highest Carter–Manaster rank of nine. An IPO's initial return is the implied return from its IPO price to its closing price on its first day of public trading. Price adjustment is the implied return from its filing date midpoint to its IPO price. Displayed values of *UWpremium* equal each underwriter's average initial returns over IPOs lead underwritten in 1984–1997; 28%(61%) of Morgan Stanley's IPOs are to the left (right) of the vertical bar placed at zero price adjustment, and 63%(28%) of Lehman's IPOs are to the left (right) of the vertical bar. IPOs to the left (right) are ex ante overvalued (undervalued). The horizontal bar is placed at the market-wide median initial return of 5.6% from 1984 to 1997.

phenomenon. Only 28% of Lehman's IPOs are located to the right of the vertical bar compared to Morgan Stanley's 61%. Hence, Morgan Stanley's higher initial returns appear to be related to its larger exposure to the partial adjustment phenomenon. If underpricing is profitable as Fulghieri and Spiegel (1993) and Loughran and Ritter (2002) suggest, then Lehman suffers from an adverse selection favoring relatively overvalued issuers, whereas Morgan Stanley has built a far more valuable franchise.

Table IV

Fama–MacBeth Style Regressions Predicting Initial Returns

Fama and MacBeth (1973) regression coefficients and t-statistics (in parentheses) are reported for the 3,937 IPOs issued in the United States from 1984 to 2000, excluding firms with an issue price less than 5 dollars, ADRs, financial firms, and REITs. IPOs issued from 1980 to 1983 and those lead underwritten by an underwriter who has managed fewer than 10 IPOs are used only to compute stable starting values for *UWpremium* and are otherwise excluded. The dependent variable, initial return (*IR*), is the return from the offer price to the first closing aftermarket price. For a given IPO, *UWpremium* is equal to the lead underwriter's average past abnormal initial return. Abnormal initial returns are actual initial returns less market-wide average initial returns in the same month. This average includes all IPOs issued by the given underwriter in the 5 years preceding filing date of the given IPO. *CMrank* is the Carter–Manaster rank as listed in Carter et al. (1998) and updated in Loughran and Ritter (2004). *UWshare* is the lead underwriter's equity market share computed over the previous calendar year. *Overhang* is equal to the pre-IPO shares retained by the issuer divided by the shares filed, both primary and secondary. *InvPrice* is the reciprocal of the filing date midpoint. *LogSize* is the natural logarithm of the original filing amount. *VC* is a dummy that is equal to one if the firm is VC-backed. $\Delta P+$ and $\Delta P-$ are the positive and negative truncated components of ΔP, which is the implied return from the filing date midpoint to the IPO price (the underwriter's price adjustment). *Mkt*15 is the cumulative NASDAQ return over the 15 trading days prior to the issue date. *PriorIR*30 is the average underpricing for all IPOs issued in the 30-day window preceding the issue date. If industry effects are set to "Yes," then industry fixed effects based on 48 Fama–French industry codes (see Ken French website) are included in the regression equation. The Fama–MacBeth method first computes annual cross-sectional regression coefficients for the IPOs issued in each calendar year. The displayed coefficients and t-statistics are computed from the time-series average of the cross-sectional coefficients. The R^2 is the average R^2 of the cross-sectional regressions. In Panel D, $\Delta P+$ and $\Delta P-$ are residuals from the following OLS regressions: $\Delta P+ = \alpha + \beta_1\, UWpremium + \tilde{\epsilon}$ and $\Delta P- = \alpha + \beta_1 UWpremium + \tilde{\epsilon}$, respectively. Because the choice of lead underwriter (*UWpremium*) is known months before ΔP, Panel D thus controls for the strategic underwriting model's prediction that ΔP and *UWpremium* will be correlated (using a method that is consistent with the direction of causality and the actual order of events).

		Dependent Variable = Initial Returns (t-Statistics in Parentheses)													
		Underwriter Quality Measures			Filing Date Control Variables				Market and Price Variables						
Row	Sample Period	*UWpremium*	*CMrank*	*UWshare*	*Overhang*	*LogSize*	*InvPrice*	*VC*	*Mkt*15	*PriorIR*30	$\Delta P+$	$\Delta P-$	Industry Effects?	R^2	Observations
		Panel A: IPO Characteristics Known on the Filing Date													
(1)	1984–1997	0.604	0.548	0.233	0.018	−0.018	0.407	0.014						0.130	3,073
		(6.15)	(1.45)	(2.79)	(3.39)	(−2.17)	(5.37)	(1.98)							
(2)	1984–1989	0.477	−0.295	0.038	0.002	0.004	0.331	0.015						0.120	774
		(2.45)	(−0.44)	(0.74)	(0.88)	(0.66)	(4.43)	(1.75)							
(3)	1990–1997	0.699	1.180	0.380	0.030	−0.034	0.464	0.013						0.138	2,299
		(7.84)	(3.80)	(3.19)	(4.61)	(−3.34)	(3.84)	(1.18)							
(4)	All (1984–2000)	0.621	1.068	0.472	0.031	−0.041	0.748	0.034						0.141	3,937
		(3.59)	(1.53)	(3.01)	(3.71)	(−2.73)	(2.61)	(1.68)							

Panel B: Add Industry Affects and Market Variables															
(5)	All (1984–2000)	0.572	0.971	0.582	0.030	−0.042	0.341	0.024	1.058	0.357			Yes	0.359	3,937
		(3.18)	(1.37)	(2.75)	(3.79)	(−2.45)	(2.11)	(1.34)	(5.18)	(4.88)					
Panel C: Add Price Adjustment Variables $\Delta P+$ and $\Delta P-$, But Assume Effects Are Separate from *UWpremium* (Counter to Theory's Predictions)															
(6)	All (1984–2000)	0.251	0.050	0.425	0.020	−0.044	−0.459	0.010	0.737	0.025	0.844	0.189	Yes	0.548	3,937
		(1.79)	(0.08)	(2.75)	(3.64)	(−2.72)	(−1.27)	(0.82)	(4.22)	(0.30)	(8.06)	(4.79)			
Panel D: Use Residual $\Delta P+$ and $\Delta P-$, Which Controls for the Correlation between $\Delta P+$, $\Delta P-$, and *UWpremium* (as Theory Predicts)															
(7)	All (1984–2000)	1.037	0.050	0.425	0.020	−0.044	−0.459	0.010	0.737	0.025	0.844	0.189	Yes	0.548	3,937
		(6.01)	(0.08)	(2.75)	(3.64)	(−2.72)	(−1.27)	(0.82)	(4.22)	(0.30)	(8.06)	(4.79)			

Table IV displays the results of Fama and MacBeth (1973) style regressions predicting initial returns (*IR*). I compute separate cross-sectional regression coefficients for IPOs issued in each calendar year, and the table's coefficients and *t*-statistics are based on the average cross-sectional coefficients. Pooled OLS regressions (not reported) generate results that are more significant than the reported Fama–MacBeth results.[19] I display Fama–MacBeth results to show that *UWpremium*'s ability to predict initial returns is both stable and persistent over time, and is not driven by clustering.

Panel A of Table IV restricts the explanatory variables to those known on the initial filing date. Rows (1)–(4) show that *UWpremium*, with a *t*-statistic that ranges from 2.5 in the 1980s to 7.8 in the 1990s, is a significant predictor of initial returns in all subsamples. The overall coefficient of 0.62 (0.96 in pooled OLS, not reported) suggests that 62% (96%) of an underwriter's average initial returns over the past 5 years are expected to continue in the following year. I refer to this result as the "underwriter persistence phenomenon."

A. Discussion

Three items lead me to conclude that existing measures of underwriter prestige are generally distinct from *UWpremium*, and likely cannot explain underwriter persistence. First, Panel A of Table IV shows that *UWpremium* predicts initial returns even when controls for the Carter–Manaster rank (*CMrank*) and the lead underwriter's market share (*UWshare*) are included.[20] Second, the *CMrank* coefficient changes sign from the 1980s (−0.30) to the 1990s (+1.18), which reproduces a result previously reported in Beatty and Welch (1996).[21] In contrast, the *UWpremium* coefficient is positive in all four rows. Third, *UWpremium* correlates only −16% and +2% with the Carter–Manaster rank and the lead underwriter's market share, respectively.

Panel B adds industry fixed effects based on the Fama–French 48 industries, and controls for recent Nasdaq market returns (*Mkt*15) and the initial returns of recently issued IPOs (*PriorIR*30). The table shows that the *UWpremium* coefficient declines by only 8%, from 0.62 to 0.57 when these variables are added. I conclude that the majority of the underwriter persistence phenomenon cannot be explained by industry specialization, and also cannot be explained by proxies for hot IPO markets.[22]

Panel C adds positive and negative price adjustments, $\Delta P+$ and $\Delta P-$, to the regressions in Panel B. As Hanley (1993) documents, positive price adjustment

[19] Several existing studies, such as Bradley and Jordan (2002), use pooled OLS regressions.

[20] This result is further supported by regressions (not reported) that remove *CMrank* and *UWshare* from the model presented in Table IV. These regressions show that the *UWpremium* coefficient does not change materially when *CMrank* and *UWshare* are omitted or included.

[21] Although *UWshare* and *CMrank* are somewhat correlated, the results of these regressions do not change significantly when each is separately omitted from the regression.

[22] In results not reported, I find that industry effects based on two-digit or three-digit SIC codes reduce the *UWpremium* coefficient by 10% instead of 8%. I present results based on the 48 industries to be consistent with Benveniste et al. (2003), and to preserve degrees of freedom.

$\Delta P+$ is the most significant predictor of initial returns. This result is known as the partial adjustment phenomenon because it suggests that underwriters do not fully adjust the IPO price to reflect positive information learned during the waiting period. The panel shows that the *UWpremium* coefficient is 56% subsumed by $\Delta P+$ and $\Delta P-$. This result suggests that underwriter persistence and partial adjustment are related. I explore this relationship more in Section V.

Panel D controls for the expected correlation between ΔP and *UWpremium*. It predicts initial returns using residual $\Delta P+$ and $\Delta P-$ instead of their raw values. These residuals are from OLS regressions of the form

$$\Delta P+ = \alpha + \beta_1 UWpremium + \tilde{\epsilon}. \tag{14}$$

All other explanatory variables remain in their raw form. This specification is meaningful because *UWpremium* is known months before $\Delta P+$ and $\Delta P-$.[23] Panel D shows that the *UWpremium* coefficient rises to 1.04 with a *t*-statistic of 6.0. This coefficient near unity suggests that an underwriter's past initial returns are fully expected to continue. The panel summarizes the main results of this section: (1) *UWpremium* is among the most significant predictors of future initial returns and is robust to numerous controls; (2) underwriter persistence is positively related to the partial adjustment phenomenon; and (3) *UWpremium* is noteworthy because it becomes known before $\Delta P+$ and $\Delta P-$.

V. Partial Adjustment

Empirical findings in Sections III and IV show that *UWpremium* is positively related to the partial adjustment phenomenon. Implication 2 in Section II makes the theoretical prediction that high underpricing underwriters should indeed be responsible for a larger fraction of the partial adjustment phenomenon than low underpricing underwriters. In this section, I formally test this prediction.

Table V displays the results of regressions predicting initial returns using various cross-terms derived from *UWpremium*, $\Delta P+$, and $\Delta P-$. I first identify whether each IPO's lead underwriter has a value of *UWpremium* that is above or below the median value for the given year. I do this in an IPO-weighted fashion, to ensure that an equal number of IPOs lie above and below the median value. I then construct four independent variables: High *UWpremium* $\Delta P+$, High *UWpremium* $\Delta P-$, Low *UWpremium* $\Delta P+$, and Low *UWpremium* $\Delta P-$. The former two are equal to $\Delta P+$ and $\Delta P-$ when the IPO is underwritten by an above median lead underwriter, and are otherwise zero. The latter two are similarly defined for low underpricing underwriters.

The table examines the relative contribution to R^2 made by the price adjustment patterns of each group. Because both groups have the same number of IPOs a priori, one would expect the price adjustment patterns of both groups to

[23] *UWpremium* is known at the time the issuer selects a lead underwriter, which occurs well before the IPO date; $\Delta P+$ and $\Delta P-$ only become known on the IPO date itself.

Table V

R^2 Results for OLS Regressions Using Price Adjustments to Predict Initial Returns

The table displays R^2 results for various OLS regressions (coefficients and t-statistics are also reported) based on IPOs issued in the United States from 1984 to 2000, excluding firms with an issue price less than 5 dollars, ADRs, financial firms, and REITs. IPOs issued from 1980 to 1983 and those lead underwritten by an underwriter who has managed fewer than 10 IPOs are used only to compute stable starting values for *UWpremium* and are otherwise excluded. The dependent variable, initial return (*IR*), is the implied return from the IPO price to the aftermarket trading price. $\Delta P+$ and $\Delta P-$ are the positive and negative truncated components of ΔP, which is the implied return from the filing date midpoint to the IPO price (the underwriter's price adjustment). For a given IPO, *UWpremium* is equal to the lead underwriter's average past abnormal initial return. Abnormal initial returns are actual initial returns less market-wide average initial returns in the same month. This average includes all IPOs issued by the given underwriter in the 5 years preceding filing date of the given IPO. The independent variables are cross-terms based on *UWpremium* and price adjustments $\Delta P+$ and $\Delta P-$. For example, "High *UWpremium* $\Delta P+$" is $\Delta P+$ times a dummy variable that is one if *UWpremium* is above its median value in the given year the IPO is issued. Similarly, "Low *UWpremium* $\Delta P+$" is $\Delta P+$ times a dummy variable that is one if *UWpremium* is below its median value in the given year the IPO is issued. These regressions test whether the partial adjustment phenomenon is mostly explained by high or low underpricing underwriters. If "standard controls" is set to "Yes," then the regression equation includes the following controls: Carter–Manaster rank, the lead underwriter's equity market share, Overhang, the reciprocal of the filing date midpoint, the natural logarithm of the original filing amount, the *VC* dummy, the NASDAQ return 15 trading days prior to the issue date, and the average underpricing for all IPOs issued in the 30-day window preceding the issue date. I exclude the coefficient estimates for these variables to conserve space. If industry effects are set to "Yes," then industry fixed effects based on 48 Fama–French industry codes (see Ken French website) are also included. For each row in the table, the incremental R^2 is the R^2 of the given regression less the R^2 of the basis regression in each panel. In Panels A and B, the basis regression only has an intercept, and thus has an R^2 of zero (not displayed to conserve space). The "Incremental Percent Explained" is equal to the incremental R^2 divided by the incremental R^2 plus the incremental R^2 of the complementary regression in the same panel. For a regression containing price adjustments made by high (low) *UWpremium* underwriters, its complement is the regression including price adjustments for low (high) *UWpremium* underwriters.

Dependent Variable = Initial Returns (t-Statistics in Parentheses)										
		Price Adjustment Variables				Control Variables		R^2 Results		
Row	Sample Period	High *UWpremium* $\Delta P+$	Low *UWpremium* $\Delta P+$	High *UWpremium* $\Delta P-$	Low *UWpremium* $\Delta P-$	Standard Controls	Industry Effects	R^2	Incremental Percent Explained	Observations
Panel A: Positive and Negative Price Adjustment Alone										
(1)	1984–1997	1.697		0.365		No	No	0.349	82.9%	3,938
		(44.54)		(4.68)						
(2)	1984–1997		1.082		0.742	No	No	0.072	17.1%	3,938
			(13.16)		(9.25)					

				Panel B: Positive Price Adjustment Alone						
(3)	1984–1997	1.722 (45.54)				No	No	0.345	86.9%	3,938
(4)	1984–1997		1.204 (14.67)			No	No	0.052	13.1%	3,938
				Panel C: Positive and Negative Price Adjustment with Controls						
(5)	1984–1997	1.210 (28.59)		0.235 (3.08)		Yes	Yes	0.478	79.7%	3,938
(6)	1984–1997		0.903 (11.91)		0.031 (0.41)	Yes	Yes	0.380	20.3%	3,938
(7)	1984–1997					Yes	Yes	0.355	Basis	3,938
				Panel D: Positive Price Adjustment with Controls						
(8)	1984–1997	1.238 (29.91)				Yes	Yes	0.477	79.5%	3,938
(9)	1984–1997		0.911 (12.46)			Yes	Yes	0.380	20.5%	3,938
(10)	1984–1997					Yes	Yes	0.355	Basis	3,938

contribute equally to R^2. The "incremental percentage explained" column displays the actual percentage each group contributes to the total R^2 (i.e., the percentage of the partial adjustment phenomenon each group is responsible for). Panel A shows that 82.9% of the partial adjustment phenomenon is explained by the actions of high underpricing underwriters. In contrast, just 17.1% is explained by low underpricing underwriters. Panel B shows that the result is even more extreme when we only consider positive price adjustments, as high underpricing underwriters explain 86.9% of their initial return predictability. Isolating the impact of positive price adjustments is important because $\Delta P+$ is the single most important predictor of initial returns identified in the IPO literature.

Panels C and D repeat this exercise, but focus on the *incremental* contribution to initial return predictability associated with the partial adjustment phenomenon after controlling for other predictors of initial returns. For example, row (7) of Panel C shows that these controls, along with industry effects, generate a baseline R^2 of 0.355. When the price adjustment patterns of high (low) underpricing underwriters are considered, the R^2 jumps to 0.478 (0.380). Hence, high underpricing underwriters are responsible for 79.7% of the *incremental* contribution to initial return predictability made by the partial

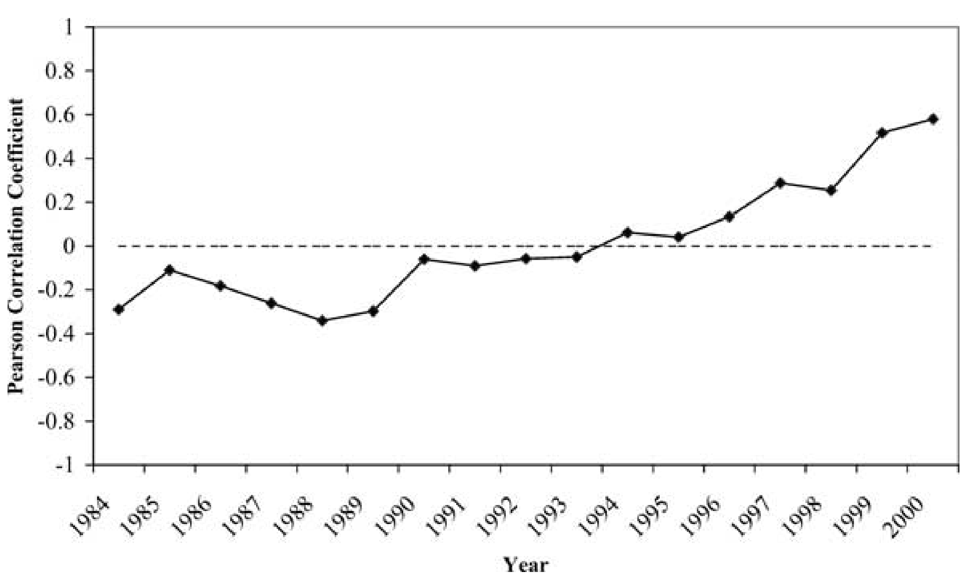

Figure 2. Correlation between *UWpremium* and underwriter market share (large underwriters only) over time. The figure displays the Pearson correlation coefficient between *UWpremium* and underwriter market share (*UWshare*) from 1984 to 2000. For a given IPO, *UWpremium* is equal to its lead underwriter's average past abnormal initial returns. Abnormal initial returns are actual initial returns less market-wide average initial returns in the same month. This average includes all IPOs issued by the given underwriter in the 5 years preceding the filing date of the given IPO. Underwriter market share is the lead underwriter's equity market share (based on dollars underwritten) in the previous calendar year.

adjustment phenomenon. I conclude that Implication 2 in Section II is broadly supported, and that the partial adjustment phenomenon is mostly driven by a predictable group of high underpricing underwriters.

VI. Market Share

Figure 2 plots the yearly Pearson correlation coefficient between *UWpremium* and underwriter market share (*UWshare*) for large underwriters issuing IPOs from 1984 to 2000. The plot is upward sloping and suggests that high (low) *UWpremium* underwriters experienced growing (declining) market share during this period. The trend is especially noteworthy during the late 1990s. Over the entire sample period, the correlation coefficient grows from −0.29 in 1984 to +0.58 in 2000. The remainder of this section formally examines the relationship between *UWpremium* and underwriter market share.

Table VI employs the methodology of Beatty and Ritter (1986), and displays the results of Fama–MacBeth regressions predicting future changes in underwriter market share. One observation represents one underwriter in a calendar year. The dependent variable is the percentage change in market share from the past 5 calendar years ($t-5$ to $t-1$) to the given calendar year t. The independent variables are the positive and negative components of *UWpremium*, that is *UWpremium*+ and *UWpremium*−. I separately examine effects for large and small underwriters for two reasons. Specifically, changes in market share can be extreme for small underwriters, but lie in tight intervals for large underwriters,[24] and it is likely that large and small underwriters may look at the tradeoff between reputation and current underwriting profits differently.[25]

Table VI shows that for large underwriters, who underwrite the majority of IPOs and IPO dollars, the *UWpremium*+ and *UWpremium*– coefficients are positive and significant. For example, large underwriters in 1984–1997 experience market share growth of 5.4% for each percentage point that their past initial returns exceed market-wide averages. Similarly, they experience a 3.5% market share decline for each percentage point that their past initial returns are below market-wide averages. The results in Panel A are noteworthy because large underwriters manage 78% of all IPOs and 91% of IPO dollars.

Panel A is most consistent with an (initial) out-of-equilibrium market gravitating toward an equilibrium in which high underpricing underwriters will have dominant market shares. In the early 1980s, high underpricing underwriters realized initial market shares that were somewhat lower than those of low underpricing underwriters. Table VI and Figure 2 show that this situation changed as high underpricing underwriters generated consistent market

[24] Because small underwriters have small initial market shares and do few IPOs, percentage changes can vary dramatically and likely contain little information. For example, a small underwriter who does a $5 million IPO in one year, and two $10 million dollar IPOs in the next year will experience a market share growth of 300%. Larger underwriters will never experience such extreme growth because their market share is averaged over many IPOs.

[25] For example, (unlike small underwriters) large underwriters likely have established reputations, and can be more aggressive when underpricing any given IPO without raising eyebrows.

Table VI

Fama–MacBeth Regressions Predicting Changes in Underwriter Market Share

One observation summarizes 1 underwriter's issuing activity in 1 calendar year (from 1984 to 2000). The dependent variable is the underwriter's percent change in market share (market share is based on the number of IPOs, consistent with Beatty and Ritter (1986)). For each observation, change in market share is equal to the underwriter's market share in the given calendar year less his market share in the 5-year interval preceding the given calendar year. *UWpremium* is the lead underwriter's average past abnormal initial return. Abnormal initial returns are actual initial returns less market-wide average initial returns in the same month. For a given underwriter in a given calendar year, this average includes all IPOs issued by the given underwriter in the 5 years preceding the given calendar year. The independent variables, *UWpremium+* and *UWpremium−* are the positive and negative components of *UWpremium*, respectively. The Fama–MacBeth regression methodology first computes cross-sectional regression coefficients for the observations in each year. Reported coefficients are equal-weighted averages of the yearly coefficients and the t-statistics are computed from the standard error of each average. R^2 is the average R^2 of the cross-sectional regressions. The Number of Observations is equal to the number of underwriter-year observations included in the market share regression. The Number of IPOs Underwritten is equal to the total number of IPOs underwritten by the underwriters included in the given size grouping (expressed as percentage in parentheses). The Total Dollars of IPOs Underwritten is the total gross proceeds (in millions) of all IPOs underwritten by these underwriters (also expressed as a percentage in parentheses). An observation is grouped into Large Underwriters if the underwriter's gross proceeds over the past 5-year period exceeds the median over the same period. Otherwise it is grouped into Small Underwriters. Separate Fama–MacBeth regressions are computed for the observations in each group.

	Dependent Variable = % Change in Underwriter Market Share (t-Statistics in Parentheses)						
		Regression Results					
Row	Sample Period	*UWpremium+*	*UWpremium−*	R^2	Number of Observations	Number of IPOs Underwritten	Total Dollars Underwritten
			Panel A: Large Underwriters Only				
(1)	1984–1997	5.41 (2.06)	3.47 (4.09)	0.096	338	2,347 (78.3%)	178,603 (90.9%)
(2)	1984–1989	6.30 (1.23)	3.85 (2.95)	0.087	148	597 (73.8%)	29,693 (87.1%)
(3)	1990–1997	4.74 (1.66)	3.19 (2.69)	0.102	190	1,750 (80.0%)	148,910 (91.6%)
(4)	All (1984–2000)	8.21 (2.32)	3.63 (4.78)	0.115	401	2,887 (80.9%)	299,915 (93.6%)
			Panel B: Small Underwriters Only				
(5)	1984–1997	−2.14 (−2.27)	5.02 (2.32)	0.119	332	650 (21.7%)	17,983 (9.1%)
(6)	1984–1989	−3.66 (−4.09)	7.05 (1.76)	0.145	145	212 (26.2%)	4,381 (12.9%)
(7)	1990–1997	−1.00 (−0.70)	3.50 (1.45)	0.100	187	438 (20.0%)	13,602 (8.4%)
(8)	All (1984–2000)	−2.84 (−2.87)	5.47 (2.85)	0.163	393	681 (19.1%)	20,425 (6.4%)

share growth over nearly two full decades. The equilibrium being approached is consistent with Implication 3 in Section II. Because growth requires an ongoing investment in personnel, real estate, and investor clientele, the gradual nature of this market share growth is not surprising. This trend might also explain Beatty and Welch's (1996) result documenting a changing relationship between underwriter prestige and initial returns (negative in the 1980s, positive in the 1990s). In particular, high underpricing underwriters appear to be gaining prestige as they gain market share.

Panel B shows that, like large underwriters, small underwriters have a positive *UWpremium* − coefficient in all subsamples. However, they have a negative *UWpremium* + coefficient. Small underwriters with high *UWpremium*+ in 1984–1997 experience a 2.14% market share decline for each point that their initial returns exceed market-wide averages. This latter result is not consistent with the model presented in Section II, but it does support Beatty and Ritter (1986), who predict that underwriters with either positive or negative *UWpremium* should experience declining market share. The authors explain that only underwriters with initial returns near market-wide averages can balance the opposing objectives of investors and issuers. Though interesting, the importance of Panel B is mitigated because small underwriters manage just 22% of new issues and 9% of IPO dollars.

VII. Information Asymmetry

In support of the information asymmetry hypothesis, tests in the previous sections show strong empirical support for its three testable implications presented in Section II. Although variations of the low-balling hypothesis can explain any one of these core implications, it has a hard time explaining all three. For example, if the low-balling hypothesis is purely behavioral, it has a difficult time explaining why high underpricing underwriters experience growing market share. In particular, it would have to explain why the least efficient underwriters are rewarded with the highest market share growth for two full decades. However, more direct tests are possible. This section considers core predictions made by both hypotheses. The low-balling hypothesis predicts that the filing date midpoints set by high underpricing underwriters should be low relative to those set by low underpricing underwriters, and that these differences should be observable in public information. The information asymmetry hypothesis predicts that high underpricing underwriters have access to better information than low underpricing underwriters.

A. Value Ratios

Although I do not present the results to conserve space, I use the methods of Purnanandam and Swaminathan (2004) to examine whether filing date midpoints are negatively related to *UWpremium* (as predicted by low-balling). Consistent with the authors, and to ensure robustness, I construct present value ratios based on comparable firm EBITDA, sales, and earnings ratios.[26] I find no statistically significant relationship between filing date midpoint value ratios and *UWpremium*. This failure to reject the null hypothesis of "no low-balling" fails to find support for the low-balling hypothesis.

It is important to note two criticisms of the valuation ratio test, in particular, its lack of statistical power, and its use of comparable firms to estimate value requires a leap of faith. With regard to the first matter, I find that these tests have sufficient power to establish that several other variables do significantly explain the cross-section of valuation ratios. For example, VC-backed IPOs have filing date midpoints that are systematically too high relative to those of non–VC-backed IPOs, consistent with the notion that VC firms provide value-added certification. Also, filing date midpoints are higher when the issuer retains more shares (higher overhang), when the issue price is lower, and when the IPO is larger. Although it is imperfect, this test's lack of support for low-balling is suggestive.

B. Analyst Revisions

To test the asymmetric information hypothesis, I examine the information content of revisions made by analysts who work for underwriters of varying *UWpremium*. This test is motivated by the likelihood that valuation skill is universally profitable and can be shared across investment banking divisions. Analysts who work for highly skilled IPO underwriters should make more informed revisions to forecasts of future earnings. I focus on revisions made regarding mature firms (firms at least 3 years past their IPO anniversary date), and hence I cleanly link underwriter-specific information quality (information asymmetry) to underwriter persistence in a context that is free from the contamination of other IPO theories.

From the I/B/E/S database, I extract all revisions to 1-year earnings forecasts and link each revision to the analyst firm's prevailing *UWpremium*, Carter–Manaster rank, and lead underwriter market share at the time the revision was made. Importantly, I only include revisions that are associated with the same fiscal year as the initial estimate being revised, that have a valid link to the Thomson SDC database, and that were made in 1987 or later because the I/B/E/S database is incomplete before this period.

Table VII displays the results of Fama–MacBeth regressions predicting the performance of firms following analyst revisions. One observation represents one revision, and the dependent variable is the firm's post-announcement style-adjusted abnormal return for 6- to 36-month horizons.[27] The variable *normalized analyst revision*, which is equal to the nominal change in forecasted earnings per share divided by the prevailing stock price in the prior month, indicates the "size" of a given revision. Intuitively, Table VII shows that larger revisions experience superior post announcement abnormal returns for all horizons. This

[26] One key data requirement is that COMPUSTAT data must be available for the fiscal year preceding the initial filing midpoint.

[27] Results are similar if the announcement returns are included.

Table VII

Long-Term Price Impact of Analyst Revisions Made by Underwriters with Varying IPO Quality Levels

Fama–MacBeth style regression coefficients and t-statistics (in parentheses) are reported for analyst revisions in the United States from 1987 to 2000. One observation is one analyst revision, and we only include revisions made by parent underwriters that served as a lead IPO underwriter for at least 10 IPOs before the given analyst revision is reported. To mitigate the effects of agency problems, we only include analyst revisions made for firms that are at least 3 years past their IPO's anniversary date. The dependent variable is the firm's post announcement style-adjusted buy and hold abnormal return, and we report results for 6-, 12-, 24-, and 36-month horizons (denoted in the second column). Style matching is based on 10 size and 5 book-to-market portfolios with NYSE breakpoints = 50 benchmark portfolios. The *normalized analyst revision* is equal to the analyst's new earnings estimate minus his last reported estimate (both for the same fiscal period), normalized by dividing by the stock price prevailing at the end of the calendar month before the revision is made. For a given underwriter, his *UWpremium* is equal to his average past abnormal initial return. Abnormal initial returns are actual initial returns less market-wide average initial returns in the same month. This average includes all IPOs issued by the given underwriter in the 5 years preceding filing date of the given revision. *CMrank* is the Carter–Manaster rank as listed in Carter et al. (1998) and updated in Loughran and Ritter (2004). *UWshare* is the underwriter's equity market share of IPOs computed over the calendar year prior to the given revision. I also include three cross-terms as independent variables, where each quality measure (*UWpremium*, *CMrank*, and *UWshare*) is multiplied by the normalized analyst revision. The Fama–MacBeth method first computes annual cross-sectional regression coefficients for the IPOs issued in each calendar year. The displayed coefficients and t-statistics are computed from the time-series average of the cross-sectional coefficients. The R^2 is the average R^2 of the cross-sectional regressions.

	Dependent Variable = Style Matched Abnormal Return (various horizons) (t-Statistics in Parentheses)									
Row	Dependent Variable	*Normalized Analyst Revision*	*UWpremium*	*CMrank*	*UWshare*	*UWpremium* × *Normalized Revision*	*CMrank* × *Normalized Revision*	*UWshare* × *Normalized Revision*	R^2	Observations
				Panel A: Various Investment Horizons						
(1)	6-month AR	1.614	0.080	0.006	−0.017	3.551		−0.872	0.005	252,573
		(5.33)	(3.01)	(2.61)	(−0.99)	(1.42)		(−0.45)		
(2)	12-month AR	2.480	0.197	0.009	−0.001	8.548		−2.279	0.007	252,591
		(4.74)	(2.75)	(1.86)	(−0.01)	(2.62)		(−1.06)		
(3)	24-month AR	5.027	0.370	0.028	−0.065	26.078		−6.789	0.007	252,628
		(5.67)	(3.69)	(3.67)	(−1.21)	(3.83)		(−1.34)		
(4)	36-month AR	9.407	0.718	0.057	−0.160	58.427		−26.371	0.007	252,683
		(7.40)	(3.66)	(3.79)	(−2.29)	(4.22)		(−3.14)		
				Panel B: Various Specifications						
(5)	36-month AR	20.357	0.704	0.054	−0.125	52.238	−1.469	−6.965	0.008	252,683
		(4.69)	(3.56)	(3.51)	(−1.82)	(3.40)	(−2.83)	(−1.01)		
(6)	36-month AR	8.088	0.423			46.146			0.005	252,683
		(6.98)	(1.86)			(3.28)				
(7)	36-month AR	8.366			0.370			−17.217	0.005	252,683
		(7.21)			(2.83)			(−2.18)		

likely arises because investors may not immediately adjust to all information contained in such revisions.

The main result from Table VII is that the *UWpremium x Normalized Revision* cross-term is significant and positive in nearly every specification. It is especially large for longer-horizon abnormal returns. This suggests that a revision made by a high *UWpremium* underwriter contains more information than a revision of similar size made by a low *UWpremium* underwriter. The fact that this result is strongest for longer horizons suggests that it cannot be explained by market irregularities surrounding the announcement date itself. Instead, it may be driven by differences in information content that investors may not be fully aware of. This result supports the core prediction of the information asymmetry hypothesis that high underpricing underwriters have access to superior information. My use of style-adjusted abnormal returns ensures that the results are not driven by differences in systematic risk, and my use of the Fama–MacBeth regression method assigns equal weight to each time interval (avoids bias from clustering in volatile markets).

Table VII shows that the Carter–Manaster rank coefficient is significant and positive. This result is similar to Carter, Dark, and Singh's (1998) finding that IPOs issued by high *CMrank* underwriters outperform because such underwriters provide value-added certification. Although it supports the certification hypothesis, the positive *CMrank* coefficient does not imply that high *CMrank* underwriters make more informed revisions. Such a hypothesis can only be tested using the cross-term *CMrank x Normalized Revision* because each revision can be upward or downward. Unfortunately, I generally omit this cross-term because this variable is 99% correlated with the normalized analyst revision variable. Regardless, the table's results are robust even in row (5), where this cross-term is included. Because the raw *UWpremium* coefficient is also positive and significant in most specifications, coverage by high *UWpremium* analysts may also signal certification. This further supports the notion that *UWpremium* can be interpreted as a measure of underwriter quality.

The table's main results are that (1) high *UWpremium* underwriters make more informative analyst revisions and (2) analyst coverage by high *CMrank* and high *UWpremium* underwriters may signal firm quality. These results are robust to several specifications, and do not appear to be influenced by multicollinearity. Although I do not present correlation tables to conserve space, I can report that *UWpremium* and *UWpremium x Normalized Revision* are less than 17% correlated with any other variable included in these regressions (including each other). I conclude that Table VII strongly supports theories of asymmetric information, and that high *UWpremium* underwriters appear to be endowed with superior valuation technology.

VIII. Underwriter Characteristics

Although I did not find support for low-balling in Section VII, I conduct an additional test in this section. In particular, I test whether low-balling might arise because high underpricing underwriters might seek compensation for providing better service. I also test for a link between *UWpremium* and the composition of each underwriter's investor clientele, as institutional underwriters may have access to better information than retail investors, as discussed. I construct the following measures of service:

Issuing Breadth: Similar to the construction of a Herfindahl index, I first compute the sum of the following three squared ratios: number of equity issues divided by total issues, number of debt issues divided by total issues, and the number of convertible debt issues divided by total issues. Total issues refers to the count of debt, equity, and convertible issues lead underwritten by the given underwriter. Issuing breadth is one minus the sum of these three squared ratios. Underwriters with higher issuing breadth provide a more balanced array of issuance products.

Debt to IPO Ratio: The number of debt issues normalized by the sum of the number of IPOs and the number of debt issues.

Log Number of Managers: The average natural logarithm of the number of managers participating in IPOs lead underwritten by the given underwriter.

Percent Analyst Coverage: The fraction of a lead underwriter's IPOs in which the lead underwriter initiated analyst coverage in the 2 years after the IPO date.

I construct the following measures of underwriter clientele:

Percent Institutional: The fraction of shares held by institutions, as reported in the Thomson institutional ownership database, on the first reported date after the IPO date. This quantity is averaged over all IPOs lead underwritten by the given underwriter.

Percent International: The fraction of an underwriter's IPOs in which there was an international tranche.

Table VIII displays the results of cross-sectional OLS regressions, where one observation represents one underwriter, and the dependent variable is a measure of underwriter quality. I examine whether underwriter quality is related to service and investor clientele. I also include controls for size and the number of IPOs completed by each underwriter during the sample period 1984–2000. I find no significant correlation between *UWpremium* and any of the four measures of underwriter service. Hence, high underpricing underwriters do not appear to provide better service. These results do not support the notion that underwriter persistence provides compensation for superior underwriting service. In contrast, *UWpremium* is significantly related to proxies for underwriter clientele. Consistent with Aggarwal, Prabhala, and Puri (2002), underwriters who allocate more shares to either institutional investors or international investors have significantly higher *UWpremium*. If institutional investors are indeed better information providers, then this result can explain how information asymmetry among underwriters can persist over long periods of time. Overall, the table finds indirect support for the information asymmetry hypothesis, and fails to find support for a specific theory of low-balling.

Table VIII

Cross-Sectional Regressions Explaining Underwriter Quality

Cross-sectional OLS regression coefficients and t-statistics (in parentheses) are reported for IPOs issued in the United States from 1984 to 2000, excluding firms with an issue price less than 5 dollars, ADRs, financial firms, and REITs. One observation is one lead underwriter, and all variables summarize his characteristics over the entire sample period. The dependent variable is *UWpremium*, *CMrank*, and *UWshare* in Panels A, B, and C, respectively. For a given lead underwriter, *UWpremium* is his average past abnormal initial return for all IPOs he issued during the sample period. Abnormal initial returns are actual initial returns less market-wide average initial returns in the same month. *CMrank* is the Carter–Manaster rank as listed in Carter et al. (1998) and updated in Loughran and Ritter (2004). A lead underwriter's *UWshare* is the average of his annual equity market shares in all calendar years in which he issued IPOs. *Issuing Breadth* is similar in the construction to a Herfindahl index. I first compute the sum of the following three squared ratios: number of equity issues divided by total issues, number of debt issues divided by total issues, and the number of convertible debt issues divided by total issues. Total issues is the total number of debt, equity, and convertible issues. Issuing breadth is one minus this sum. The *Debt to IPO ratio* is the number of debt issues divided by the sum of the number of IPOs and the number of debt issues. The *Log Number of Managers* is the average natural logarithm of the number of managers participating in IPOs lead underwritten by the given underwriter. *Percent Analyst Coverage* is the fraction of an underwriter's IPOs in which he initiated analyst coverage in the 2 years after the IPO date. *Percent Institutional* is the fraction of shares held by institutions, as reported in the Thomson institutional ownership database, on the first available date after the IPO date. This quantity is averaged over all IPOs lead underwritten by the given underwriter. *Percent International* is the fraction of an underwriter's IPOs in which some shares were sold to international investors. *Average Log IPO Size* is the average filing date midpoint times the number of shares filed. *Log Number of IPOs* is the natural logarithm of the number of IPOs completed by the given underwriter during the sample period.

	Dependent Variable = Underwriter Quality (Varies for Panels A, B, and C) (t-Statistics in Parentheses)									
	Underwriter Service Variables				Underwriter Clientele		Control Variables			
Row	*Issuing Breadth*	*Debt to IPO Ratio*	*Log Number of Managers*	*Percent Analyst Coverage*	*Percent Institutional*	*Percent International*	Average Log IPO Size	Log Number of IPOs	R^2	Observations
	Panel A: Factors Associated with Underwriter-Specific Initial Returns (*UWpremium*)									
(1)	0.064		0.034		0.005	0.460	−0.051	0.091	0.233	93
	(0.88)		(0.29)		(2.09)	(2.34)	(−2.90)	(3.34)		
(2)		0.087	0.051		0.006	0.464	−0.051	0.091	0.239	93
		(1.22)	(0.44)		(2.20)	(2.42)	(−2.91)	(3.35)		
(3)	0.037		−0.120	0.022	0.005	0.317	−0.033	0.071	0.155	80
	(0.44)		(−0.80)	(0.58)	(1.70)	(1.45)	(−1.60)	(2.40)		

Panel B: Factors Associated with the Carter–Manaster rank (*CMrank*)										
(4)	2.991		1.804		0.037	−1.803	1.649	0.091	0.639	93
	(4.54)		(1.71)		(1.60)	(−1.01)	(10.39)	(0.37)		
(5)		2.785	2.484		0.045	−0.999	1.650	0.091	0.631	93
		(4.26)	(2.32)		(1.90)	(−0.56)	(10.27)	(0.36)		
(6)	2.613		1.543	0.444	0.041	−0.689	1.569	0.213	0.637	80
	(3.52)		(1.19)	(1.33)	(1.71)	(−0.36)	(8.89)	(0.83)		
Panel C: Factors Associated with Underwriter Market Share (*UWshare*)										
(7)	0.058		−0.018		−0.001	−0.042	0.017	0.033	0.377	93
	(2.68)		(−0.53)		(−1.95)	(−0.72)	(3.27)	(4.09)		
(8)		0.057	−0.005		−0.001	−0.028	0.017	0.033	0.377	93
		(2.67)	(−0.14)		(−1.73)	(−0.49)	(3.27)	(4.08)		
(9)	0.050		−0.042	0.002	−0.001	−0.027	0.020	0.026	0.556	80
	(2.85)		(−1.40)	(0.28)	(−2.12)	(−0.62)	(4.85)	(4.41)		

Panel B shows that, unlike *UWpremium*, the Carter–Manaster rank (*CMrank*) is related to underwriter service. High *CMrank* underwriters have (1) greater issuing breadth, (2) more active debt issuance programs, and (3) larger managing syndicates. However, they are not more likely to provide analyst coverage. Unlike *UWpremium*, *CMrank* is not related to proxies for underwriter clientele. Thus, high *CMrank* underwriters appear to be institutional or retail with roughly equal frequency. These results broadly confirm that *UWpremium* and *CMrank* are distinct, and that underwriter quality may be two dimensional.

Table VIII suggests that none of the three quality measures are significantly related to analyst coverage. This may seem surprising because Loughran and Ritter (2004) and Cliff and Denis (2004) argue that underpricing is, in part, compensation for providing access to high impact analysts (the "analyst lust" hypothesis). In regressions not shown to conserve space, I confirm the results of these existing studies and find that all three quality measures are positively correlated with percent analyst coverage if I restrict my sample to the late 1990s (results are strongest using regressions that treat one IPO, instead of one underwriter, as one observation). Hence, the ability of analyst coverage to predict underwriter-specific initial returns in the late 1990s supports Loughran and Ritter's (2004) argument that the issuer's objective function may be changing.

IX. Conclusion

This study documents new evidence of underwriter-specific persistence in initial returns that is economically large. The three most notable features of high underpricing underwriters are that their price revisions explain 80% of the partial adjustment phenomenon, analysts who work for high underpricing underwriters make revisions to forecasted earnings that appear to be more informative than those made by analysts who work for low underpricing underwriters, and high underpricing underwriters are more likely to serve an institutional rather than a retail client base. These results are robust to numerous controls including industry, underwriter characteristics including prestige and size, and hot IPO markets. I also find that among established underwriters, those that underprice more experience growing market share throughout the sample period.

The link between partial adjustment and underwriter persistence classifies possible explanations of underwriter persistence into one of the following two stories: (1) high underpricing underwriters have access to superior information, and they use their advantage to win mandates with more valuable issuers (private information), or (2) some underwriters persistently low ball the initial filing midpoint (public information). Although neither hypothesis can be entirely ruled out, the evidence broadly supports information asymmetry, and I find no evidence supporting low-balling.

Consistent with the theoretical link between underwriter-specific components of underpricing and information quality, I define a measure of underwriter quality, *UWpremium*, that is based on past initial returns and identify factors that explain its variation. I find that underwriters who score highly appear to be better at valuing firms, and tend to have institutional (not retail) clientele. I also find that larger underwriters tend to experience growing market share. Moreover, *UWpremium* is among the most important predictors of future initial returns, and appears to be distinct from existing quality measures. I conclude that the notion of underwriter quality may be (at least) two dimensional.

Appendix

In this section, I outline a proof of Proposition 1. When the proposition's assumptions hold, first note that G and U's objectives in equations (5) and (6) are quadratic with respect to the control parameters $P_{G,H}$, $P_{G,L}$, and P_U, so the set of linear first-order conditions implied by them has a unique solution. By examining the second derivatives, one can confirm that this unique solution is a maximum, as required. This unique maximum is the equilibrium depicted in Proposition 1.

To complete the proof of equilibrium existence, note that the probabilities depicted in equation (2), which are substituted into equations (5) and (6), must lie in the interval (0,1). Hence, to confirm existence, I must also confirm that neither G nor U prefers to deviate to a bid price that would generate a "corner probability" of exactly one or zero.

There are eight possible "corner deviations," and all can be examined using similar methodology.[28] Seven are never profitable when the parameters are positive, and can be ruled out. I therefore examine only one deviation ($\{(1,$ *interior*$), (0,$ *interior*$)\}$) in this appendix to conserve space, and because this deviation can be profitable for some parameter values. In particular, if U deviates and bids lower than $(P_{G,H} - \frac{S}{2})$, then U would attract high value entrepreneurs with a probability of exactly zero (underwriter G's probability would be exactly one). U's deviating objective then simplifies to the following based on low value entrepreneurs alone:

$$\underset{P_U}{\text{MAX}} \frac{1}{2}\left(\frac{1}{2} + \frac{P_U - P_{G,L}}{S}\right)\gamma(V - P_U). \tag{A1}$$

To identify U's most profitable such deviation, hold $P_{G,L}$ fixed at the equilibrium level and solve U's reduced objective in equation (A1) to obtain the following IPO price (U's best deviation):

$$P^*_{U,\text{dev}} = V - \frac{S}{2} + \frac{\sigma}{8}. \tag{A2}$$

By substituting the equilibrium strategies and the deviating strategy into U's objective, U's equilibrium profit and U's profit from deviating can be written as follows:

[28] Using the notation $\{(PR[\text{G wins} \mid \tilde{\mu} = 1], PR[\text{G wins} \mid \tilde{\mu} = 0]), and (PR[\text{U wins} \mid \tilde{\mu} = 1], PR[\text{U wins} \mid \tilde{\mu} = 0])\}$, the eight corner deviations are: {(1,1),(0,0)}, {(1,interior),(0,interior)}, {(1,0),(0,1)}, {(interior,1),(interior,0)}, {(interior,0),(interior,1)}, {(0,1),(0,0)}, {(0,interior), (0,interior)}, and {(0,0),(0,1)}.

$$\pi_{U,\text{equilibrium}} = \gamma\left(\frac{S}{4} - \frac{\sigma^2}{8S}\right), \quad \pi_{U,\text{deviate}} = \frac{\gamma(2S^2 - \sigma^2)}{16S}. \tag{A3}$$

By setting these profit levels equal and solving for σ, I identify the requirement for equilibrium existence stated in Proposition 1:

$$\sigma \leq \sqrt{2}S. \tag{A4}$$

When the parameter σ is larger than this level, U's profit from deviating exceeds equilibrium profits, and hence U will bid the price depicted in equation (A2). If the condition in equation (A4) is not violated, then equilibrium profits exceed those from the best deviating strategy, and hence both underwriters will optimally choose to bid equilibrium prices. Because the equilibrium strategies are always interior (have selection probabilities in (0,1)) when the condition in equation (A4) holds, and because the seven other deviating strategies can be eliminated, this completes the proof of existence.

To prove uniqueness, first recall that the objectives in equations (5) and (6) are quadratic and have a unique interior solution. To complete the proof, it is thus sufficient to show that no other equilibria exist in which either G or U win high or low value mandates with corner probabilities of one or zero. All such cases can be ruled out using trivial arguments with one exception. The relevant candidate equilibrium involves G winning high value issuers with probability one, and both underwriters sharing the market for low value issuers.

Although this candidate equilibrium cannot be ruled out with trivial arguments, one can show that U will always deviate from this candidate equilibrium. In particular, first note that equilibrium conditions require that underwriter G will bid the lowest price possible that maintains his 100% market share of high value issuers. Equation (2) indicates that this price is

$$P_{G,H}{}^* = P_U + \frac{S}{2}. \tag{A5}$$

However, by examining U's profit from this candidate equilibrium and his profit from deviating (using the same methodology as above), it can be shown that underwriter U will always deviate from this candidate equilibrium. In particular, U can profit by bidding slightly higher, and capturing a nonzero market share of the very profitable high value issuers. This completes the proof of uniqueness.

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