Institutional Allocation in Initial Public Offerings: Empirical Evidence

Reena Aggarwal
McDonough School of Business
Georgetown University
Washington, D.C., 20057
Tel: (202) 687-3784
Fax: (202) 687-4031
aggarwal@georgetown.edu

Nagpurnanand R. Prabhala
Robert H. Smith School of Business
University of Maryland
4427 Van Munching Hall
College Park, MD 20742
Tel: (301) 405-2165
Fax: (301) 405 0359
nprabhal@rhsmith.umd.edu

Manju Puri
Stanford University and NBER
Graduate School of Business
518 Memorial Way
Stanford, CA 94505
Tel: (650) 723-3402
Fax: (650) 725 6152
puri_manju@gsb.stanford.edu

August 29, 2001

Institutional Allocation in Initial Public Offerings: Empirical Evidence

Abstract

We analyze institutional allocation in initial public offerings (IPOs) using a new dataset of US offerings between 1997 and 1998. We document a positive relation between institutional allocation and day 1 IPO returns: for instance, institutions get under 60% of overpriced issues but about 75% of underpriced issues. The positive relation is partly explained by the practice of giving institutions more shares in IPOs with strong pre-market demand, as predicted by book-building theories. However, our tests suggest that institutional allocation also contains private information about first-day IPO returns not reflected in pre-market demand and other public information. Our evidence supports book-building theories of IPO underpricing, but suggests that institutional allocation in underpriced issues is in excess of that explained by book-building alone.

Institutional Allocation in Initial Public Offerings: Empirical Evidence

It is well known that initial public offerings (IPOs) are underpriced on average. Underpricing is a robust phenomenon that extends across equity markets in several countries and time periods (see, e.g., Loughran, Ritter, and Rydqvist, 1994). For example, in our sample of IPOs offered during 1997-1998, the average day 1 return of issues is 19.25%. In these offerings, the total money "left on the table" due to underpricing is a substantial $3.5 billion.[1] While the existence of these initial gains is widely known and has been exhaustively documented, there is surprisingly little research on how these gains are divided between different investors in IPOs.

IPO underwriters play a central role in determining the division of first day gains between different investors. Underwriters possess substantial information about issue demand as a result of their information gathering activities during the book-building process, and in the U.S. market, they have considerable latitude on how IPO shares are allocated. In principle, underwriters can favor preferred investors by allocating them more shares in "hot" issues that are expected to trade up strongly in the aftermarket. Whether underwriters do so is the subject of an active and ongoing debate in the academic literature and the financial press, but formal empirical evidence on such issues remains sparse.

Articles in the recent press certainly suggest that underwriters extend favors to their institutional clientele.[2] The U.S. Attorney's office, the Securities and Exchange Commission

[1] See Habib and Ljunqvist (2001) and Loughran and Ritter (2001) for detailed analyses of money left on the table.

[2] For details see the following articles in the *Wall Street Journal:*, "CSFB and employees may face NASD charges over IPO sales," by Randall Smith and Susan Pulliam, May 2, 2001, pp. C1; "SEC intensifies inquiry into commissions for hot IPOs," by Susan Pulliam, Randall Smith, and Charles Gasparino, December 13, 2000, pp. C1; "Linux deal is focus of IPO-commission probe," by Susan Pulliam and Randall Smith, December 12, 2000, pp. C1; "U.S. probes inflated commissions for hot IPOs," by Randall Smith and Susan Pulliam, December 7, 2000, pp. C1.

(SEC), and the regulatory arm of National Association of Securities Dealers, NASDR, have initiated investigations into whether investment banks allocate more shares in "hot" IPOs to favored institutional clientele, possibly in exchange for unusually large trading commissions in subsequent trades, which could violate NASDR rules requiring brokers and dealers to maintain standards of fair practice. Institutional investors may also be granted more shares in an issue in exchange for a commitment to buy additional shares in the aftermarket, although tying of IPO allocations to aftermarket purchases violates securities laws and thus concerns regulators. In addition to the investigations and the debate in the recent financial press, the theoretical IPO literature also suggests that underwriters may favor their institutional customers. However, the quid pro quo for such favorable treatment is the information on IPO demand provided by such investors to underwriters, rather than short-term trading commissions or aftermarket purchases that are the focus of current SEC investigation. It has been suggested that the complete IPO process, including allocations practices, need to be studied and is "an area ripe for rule-making" by the SEC.[3]

While there has been much speculation about these aspects of the IPO process, the available empirical evidence on these issues is limited and does little to inform the ongoing debate. The primary obstacle to formal empirical research has been the lack of data. Regulations in the U.S. do not mandate public disclosure of allocations followed by underwriters, and consequently it remains a relatively opaque aspect of the IPO process. Our paper takes a step towards filling in the gap. We contribute new empirical evidence using a new and unique dataset of IPOs that includes information on the percentage of an issue allocated to institutional and retail investors.

[3] See "SEC targets IPO process with probes," by Charles Gasparino, Michael Schroeder, and Kathryn Kranhold, December 19, 2000, p. C1, *Wall Street Journal*.

We find, not surprisingly, that institutions dominate IPO allocations, accounting for a median of about three-quarters of shares offered in an issue. We investigate the cross-sectional variation of the institutional allocation in IPOs, focusing on two themes. The first part of our analysis examines whether institutions concentrate more in the better performing IPOs, while our subsequent analysis evaluates alternative explanations for *why* there is positive relation between institutional allocation and underpricing. We find that institutions do tend to earn greater profits on their IPO investments compared to retail investors. Part of the institutional-retail differential can indeed be attributed to favorable allocation patterns followed by underwriters. Underwriters tend to allocate more shares to institutions in IPOs priced at the upper end of the filing range, which are ex-ante *expected* to appreciate more in the aftermarket. Conversely, institutional allocation is significantly lower in lower-end issues that are less likely to appreciate in the aftermarket. These findings are consistent with book-building models of IPO underpricing (Benveniste and Spindt, 1989; see also Cornelli and Goldreich, 2001) in which underwriters allocate more shares to institutions in issues in which they obtain more favorable pre-market demand information. This information enables underwriters to increase the offer price to the high end of the filing range. Hence, as per the book-building models, we should see correlations between institutional allocation and issues priced in the high end of the filing range, which is borne out in our results.

However, book-building does not appear to completely explain the entire institutional-retail differential. Institutional allocation also contains private information about day 1 returns not reflected in other variables, such as the offer price relative to filing range, that predict an IPO's day 1 return. In particular, institutions appear to be adept at avoiding "lemons" in the IPO market, as suggested by the Rock (1986) theory of IPO underpricing. Thus, our results on institutional allocation patterns support both major paradigms underlying the theoretical

literature on IPO underpricing, i.e., the book-building model of Benveniste and Spindt (1989) and the "lemons" model of Rock (1986). We also provide an economic measure of the institutional-retail differential by estimating the returns to the aggregate pool of institutional and retail capital invested in our sample of IPOs.

Our evidence adds to that in Hanley and Wilhelm (1995), the only published empirical study on IPO allocations in the U.S. we are aware of.[4] Hanley and Wilhelm (henceforth HW) present a clinical study of institutional allocation patterns followed by one underwriter for 38 IPOs offered between 1983 and 1988. We add to the HW evidence in terms of both scope and substantive findings. Our sample is much larger, it is drawn from a more recent period of time, and we have a cross-section of nine underwriters versus their one underwriter sample. Our methodology is also different: we control for the endogeneity of institutional allocation and explicitly distinguish between the effect of the endogenous and excess institutional allocation on day 1 returns using two-stage estimates. Finally, we report new and different results. We find, as do HW, that institutions get a greater percentage of shares in IPOs with strong pre-market demand. However, while HW report that institutional allocations are similar in both strong and weak-opening IPOs, we find that institutional allocation concentrates more in stronger opening IPOs and less in IPOs with low day 1 returns. Additionally, we develop new evidence on whether the positive relation between underpricing and institutional allocation is beyond that predicted by pre-market demand. We find that while book-building is important, institutional allocation in underpriced issues is in excess of that explained by book-building alone.

[4] Ljungqvist and Wilhelm (2001) analyze institutional allocation focusing on issues offered in France, Germany, and UK. Their dataset also includes a small sample of 30 Goldman Sachs managed IPOs offered between March 1993 and July 1995.

The rest of the paper is organized as follows. Section I describes our unique dataset and some cross-sectional characteristics of our sample. Section II examines institutional allocation in IPOs. We analyze whether institutions obtain preferential allocations in more underpriced issues and explore how the first day gains in IPOs are divided between institutional and retail investors. Section III provides two-stage least squares estimates that control for the endogeneity of institutional allocation. Section IV offers conclusions.

I. Data

We identify IPOs offered between May 1997 and June 1998 from the Securities Data Company's New Issues database excluding American Depository Receipts, unit offerings, closed-end funds, and real estate investment trusts. This time period is selected because our SEC-collected allocation data come from this time period. These allocation records are not submitted routinely to the regulators as part of any public disclosure requirements but are maintained by the lead manager. For the purpose of this study, the information was requested from nine investment banks for all issues in which they were a lead manager.[5] Out of these nine banks, five are among the ten largest banks based on market share during this time period, while four do not belong to the top-ten category.

For 164 IPOs we know the aggregate allocation to institutional and retail investors for the entire issue. If allocation for the entire issue is not available, we use the lead manager's allocation as a proxy, resulting in a total sample of 174 issues. The correlation between total institutional allocation and the lead investment bank's institutional allocation is 0.76. The median and mean institutional allocation in the sample of 174 issues equals 74.26% and

[5] We are unable to disclose the names of the investment banks but our empirical analysis does use a reputation variable.

72.77%, respectively. Issue-specific data such as the filing range, number of shares offered, and offer price are obtained from the New Issues database of SDC. This information is supplemented with daily closing prices for each offering from Bloomberg and Dow Jones. We classify underwriters based on their reputation (e.g., Carter and Manaster, 1990; Megginson and Weiss, 1991). Following Megginson and Weiss, the market share of underwriters is used as a basis for assigning underwriter reputation. The reputation dummy variable for an IPO equals 1 if the IPO's lead manager is ranked among the top ten in terms of dollar proceeds among all IPOs issued between May 1997 and June 1998, and it is zero otherwise.

Table I reports descriptive statistics for our sample as well as the population, which comprises all firm commitment IPOs listed in the SDC New Issues database excluding ADRs, units, closed-end funds, and REITs offered between May 1997 and June 1998. The sample of IPOs has mean (median) proceeds of $132.2 million ($63.9 million) versus the population mean (median) of $75.55 ($36.00) million. The mean (median) offer price for our sample is $15.09 ($15) versus $12.37 ($12.00) for the population. Thus, the sample used in this study consists of larger issues offered at higher prices compared to the population. Over two-thirds of our sample clusters at a gross spread (statistics not reported in Table I) equal to 7%, consistent with Chen and Ritter (2000) and Hansen (2000).

Each IPO is classified based on whether the final offer price is above, within, or below the initial filing range. The sample of IPOs shows some dispersion across this characteristic. About a third of our sample issues are priced above the filing range, about a fifth are priced below the range, while the vast majority, about 50% of our sample, is priced within the filing range. The percentage difference between the midpoint of the filing range and the offer price, UPDATE, has a median value of zero. The median IPO is priced at the mid-point of the filing

range and spends 69 days in the registration process. The mean and median underpricing in our sample equals 19.25% and 12.80%, respectively, which exceed the population underpricing.

II. Institutional Allocations and Profits in IPOs

A key question in IPO allocations is whether institutional capital concentrates in better performing issues, while leaving weaker-performing issues to retail investors. If, as it turns out, institutions perform better than retail investors, why this differential? Is it because institutions receive more shares in IPOs with strong pre-market demand and predictably better day 1 returns, a central implication of book-building theories of IPO underpricing? Alternatively, do institutions concentrate in better IPOs beyond what can be explained by pre-market demand and the book-building process? We bring to light new evidence to address these questions.

Section A begins by developing some *a priori* evidence that institutions do perform better than retail investors in IPOs. Sections B and C examine why institutions perform better. Section B asks if underwriters favor institutions with more shares in IPOs with strong pre-market demand, which are offered at the upper end of the filing range and have predictably greater day 1 returns. We find evidence of such favorable treatment, consistent with the Benveniste and Spindt (1989) theory of book-building in which underwriters favor investors in exchange for favorable demand information.

Section C asks if institutional allocation has information about IPO underpricing beyond what can be attributed to pre-market demand. We find that this is the case. Thus, institutional allocation reflects information about underpricing not fully captured in other variables that are publicly known at the offering. This suggests that institutions may be privately informed about IPO value, as in Rock (1986). Alternatively, underwriters may have private information and use it to favor institutions for reasons beyond book-building, since our

specification controls for pre-market demand. We end Section II by characterizing the economic magnitude of the return differential between institutional and retail capital in the aggregate.

A. Dollar Profits to Institutional and Retail Investors: Do Institutions Perform Better?

Panel A of Table II reports the mean and median (the number in parentheses) dollar profit per issue accruing to institutional and retail investors in IPOs. For each issue, we compute the total first-day dollar gain as the product of the day 1 return and the issue proceeds. We multiply the day 1 gain by the percentage allocated to institutional investors to obtain the portion of the day 1 gain accruing to these investors. Iikewise, the day 1 dollar gain of an issue is multiplied by the percentage allocated to retail investors to obtain the dollar profits from the issue accruing to retail investors.

For the overall sample, the mean profit per issue accruing to institutional investors is $14.79 mm (median = $6.61 mm), while retail institutions average $5.28 mm (median = $2.29 mm), a third of the average profit per issue for institutions. While the dollar profits are quite different between institutional and retail investors, the capital invested by the two classes of investors also differs by a similar order of magnitude. We examine differences in the rates of return subsequently in Section D. The differences in profit-per-issue between institutions and retail investors accords well with the average institutional allocation of 72.77% (first column of Panel D in Table II), also about three times the allocation to retail investors. The total money left on the table in our sample can be computed by adding the average per issue profits of both categories of investors and multiplying by the number of IPOs (174); doing so gives the figure of $3.5 billion reported earlier.

Panel A of Table II also reports returns and profits per issue classified by the size of the day 1 return of the IPO. We divide IPOs into three categories: overpriced IPOs, which have a negative day 1 return, moderately underpriced IPOs, which have positive returns of less than 20%, and highly underpriced IPOs, which have day 1 returns exceeding 20%. Zero return IPOs have zero returns and profits by definition, and these are excluded in Table II.[6] We find two interesting patterns in the dollar profits for IPOs.

1. Per issue profits on both moderately and highly underpriced issues outweigh the per issue losses on overpriced issues. For example, the average institutional profit on moderately underpriced IPOs (column 3) equals $11.31 mm versus the mean per issue loss on overpriced issues (column 2) of -$1.92 mm. The per issue loss in overpriced IPOs is lower because the negative returns on overpriced IPOs are less in absolute magnitude compared to positive day 1 returns, and also because negative return IPOs tend to have lower issue proceeds.
2. More interestingly, institutional-retail profit differentials are not constant across the three categories of IPOs. Differentials are more pronounced in the most underpriced issues and are less prominent in overpriced issues. In overpriced issues, institutions lose an average of $1.92 mm per issue, about 1.08 times the average loss per issue of $1.77 mm for retail investors. For moderately underpriced issues, institutions earn an average of $11.31 mm, about 2.69 times the average of $4.20 mm for retail investors. Finally, for the most underpriced issues, institutions earn an average of $27.32 mm per issue, 2.83 times what retail investors take away from these issues.

[6] The 22 IPOs with zero returns on day 1, which are excluded from Table II, have mean and median institutional allocations of 71.12% and 73.54%, respectively. The difference in institutional allocation between overpriced and underpriced IPOs continues to be significant (Wilcoxon z (p) = -2.09 (0.04)) even when the zero return IPOs are included in the overpriced group.

Thus, per issue profit differentials are greater in the most underpriced and moderately underpriced issues than in the overpriced issues.

The results provide some initial evidence that institutional capital in IPOs earns greater profits in IPOs at the expense of retail investors because institutions earn a larger proportion on the upside but share the downside in weaker issues more evenly with retail customers. The data on institutional allocation (last row of Panel D, Table II) are consistent with this notion. The mean (median) institutional allocation for overpriced issues is 59.73% (56.09%) versus 71.65% (72.87%) for moderately underpriced issues, and 76.69% (75.87%) for highly underpriced issues. Thus, institutions are allocated a lower proportion of shares in overpriced issues compared to either group of underpriced issues or underpriced issues as a whole (Wilcoxon z = 2.78, significant at 1%).

We extend the Panel A findings in two directions. First, we reexamine the results for longer holding periods because the results based on day 1 returns may be biased by a combination of price support and limits on flipping. For example, losses on overpriced issues may be greater without price support and restrictions on flipping may limit investors' ability to realize gains on underpriced issues. These biases suggest that the true profit differentials may be somewhat greater than suggested in Panel A, and it may be useful to consider returns over not just one day but longer horizons as well. The longer data also offers the advantage of incorporating allocation data from the significant number of IPOs opening with zero return (22 issues) excluded from Panel A.

On the other hand, the longer horizon results may be less powerful. One reason is that at longer horizons, there is greater likelihood of price movements unrelated to the initial IPO uncertainty. Additionally, Ellis, Michaely and O'Hara (2000) document a sharp decline in IPO trading volume after the first two trading days, suggesting that investors mostly adjust their IPO

holdings within this initial period. A characterization of the true profitability of institutional and retail investment in IPOs requires us to know when each type of investor sells in the aftermarket, and the direct and indirect costs of selling (including diminished allocations in the future). While this is an interesting avenue of research beyond our scope and data, it is certainly useful to supplement the one-day analysis with some evidence from longer horizons.

An empirical question is the length of time over which we should consider the longer horizon analysis. We look to prior literature for some guidance. Ellis, Michaely, and O'Hara (2000, pp. 1062) find that underwriters have built up 80% of their peak aftermarket inventory in the first 5 trading days itself, while the inventory starts to decline after 20 days. This suggests that support is concentrated in the first week and is altogether complete a month after the IPO. Aggarwal (2000) reports that most price support activities end within 10 days of an issue – the median stabilized IPO has *zero* stabilization after a week; most short covering is concentrated in the first few days of trading when volume is at a peak. These considerations suggest that we should incorporate horizons of 5 to 20 trading days after the IPO offer date. Panel B reports the evidence based on ten-day returns (the return cutoffs in Panel B are based on ten day returns being below or exceeding 0% or 20%). The Panel B patterns are broadly similar to those in Panel A. The profit of institutional investors is 1.89, 2.95, and 2.72 times that of retail investors for overpriced, moderately underpriced, and highly underpriced issues, respectively. Thus, differentials between institutions and retail customers are less prominent in the overpriced issues relative to the others. Panel C reports similar evidence for 20 trading days after the IPO's opening.

A second extension of the evidence in Panel A of Table II is to consider return cutoffs above 20%. One purpose of this analysis is to verify whether the patterns in Table II are robust. In particular, popular accounts of underwriter favoritism often speculate that institutions

perform better because they get disproportionately more shares in the most highly underpriced issues, while retail investors are essentially frozen out of participation in this segment of IPOs. Using return cutoffs well above 20% allows us to evaluate this question. We experimented with return cutoffs of 30%, 40%, and 50%, which approximately correspond to the 80^{th}, 85^{th}, and 90^{th} percentile of the day 1 returns. We find patterns essentially similar to those in Panel A of Table II. The variation in IPO allocations within underpriced issues is modest compared to the variation in allocation between underpriced and overpriced issues. For instance, mean and median institutional allocation is 77.88% and 75.06%, respectively, for the 26 IPOs with initial returns greater than 40% versus 76.69% and 75.87%, respectively, for IPOs with returns greater than 20% (last column in Table II, Panel D). On the other hand, overpriced IPOs have mean and median institutional allocation of 59.73% and 56.09%, respectively. Thus, favoritism on the part of underwriters seems to occur primarily via the mechanism of lower institutional allocation in overpriced issues rather than even higher allocations in the best performing IPOs.

Another interesting question relates to the *variation* in institutional allocation: are allocation schedules relatively flat, as might be suggested by a mechanical allocation rule of giving fixed percentages to institutions, or is there some variation in allocation across or within different return categories? The standard deviation of institutional allocation lies between 14 percent and 19 percent for all initial return categories except the highest return categories, where it is significantly lower. For example, in the category of issues with initial return greater than 20%, the standard deviation of allocation is 7.97%, while it is 7.73% for issues with return greater than 40%.

Section A has documented that institutions appear to perform better than retail investors in IPOs. The next two sections investigate why. Section B asks if institutions do better because they routinely receive more (less) shares in IPOs with strong (weak) pre-market demand, a

central implication of Benveniste and Spindt (1989), the book-building paradigm for explaining IPO underpricing. Section C analyzes if institutional allocation reflects additional private information that is not captured by the pre-market demand, as is suggested by the Rock (1986) framework for explaining IPO underpricing.

B. Allocation Versus Pre-Market Demand

IPOs priced at the upper end of the filing range tend to have strong pre-market demand. These IPOs have predictably higher day 1 returns compared to issues priced at the lower end of the filing range. This well-known "partial adjustment'' phenomenon (Hanley, 1993) is detailed recently in Ritter (1998), who reports that virtually all IPOs priced above the filing range had positive day 1 returns, while only about half of those priced below the filing range have positive initial returns.[7] In this section, we examine whether underwriters allocate more shares in IPOs to institutions when the pre-market demand for an issue – and hence the likely day 1 appreciation of the issue – is high.

Our proxy for pre-market interest is the variable UPDATE, the percentage difference between the midpoint of the filing range and the offer price.[8] Model 1 in Table III reports results from a univariate regression of the percentage institutional allocation on UPDATE, whereas model 2 reports estimates of a multivariate specification that includes other variables potentially related to institutional allocation. Among these controls is the size of the IPO, or the dollar proceeds of an issue excluding the Green Shoe amount. Large issues may have lower institutional allocation because institutions are less likely to be able to absorb the entire supply

[7] See also Loughran and Ritter (2001) and Lowry and Schwert (2001) for other evidence on partial adjustment.
[8] We check for an asymmetric component in UPDATE by adding a variable UPDATE+, equal to 1 if the offer price is above the filing range and zero otherwise. UPDATE+ itself was insignificant and did not change the other coefficients.

of shares in large issues. Additionally, large issues may be less risky and retail investors may face less lemons problems in such issues (Beatty and Ritter, 1986). Institutions may also be reluctant to take up more shares in small issues because of the disclosure requirements triggered by additional purchases when stakes are 5% or above (Section 13G of the 1934 Securities Act). We consider three proxies for size: issue proceeds, assets of the issuer before the offer, or the number of shares offered in the IPO. While all three proxies give similar results, we report the estimates based on the number of shares.[9] Because the size variables are all skewed, we specify the regression using the natural logarithm of the number of shares offered (in millions) as an independent variable. We also include the number of days spent in the registration process as an explanatory variable. IPOs that spend more time in the registration process may be weaker issues that are associated with lower institutional allocation (see, e.g., Hanley (1993), p. 239). Alternatively, issues may spend more time in registration in times of high issuance volume (and high underpricing) because of the relatively fixed processing capacity at the SEC in hot periods. This suggests that the correlation between underpricing and time spent in registration may be positive. The regression also includes an underwriter reputation dummy equal to one if the lead underwriter is among the ten largest investment banks based on market share during this time period and zero otherwise. Finally, one-digit SIC dummies (not reported here) for industry controls are incorporated into our specifications.

In both the univariate and multivariate regressions, UPDATE has a positive and significant coefficient. Thus, underwriters do favor the aggregate pool of institutional capital by allocating more shares in IPOs with stronger pre-market indications of interest. A change in

[9] With regard to issue proceeds, Habib and Ljungqvist (1998) argue that there is a mechanical relation between underpricing and issue proceeds even after controlling for uncertainty. On the other hand, imposing the requirement that pre-IPO assets be available results in our about a quarter of our sample.

UPDATE from its first quartile to third quartile, 93.3% to 109.1%, results in an increase in institutional allocation of 5.5%, or about a third of the interquartile variation in institutional allocation (16.49%). On a standalone basis, the variable also explains an economically significant 9.27% of the variation in institutional allocation. Underwriter reputation has a negative coefficient, suggesting that reputed underwriters give more shares to retail customers. This result should be interpreted with caution because our sample has nine underwriters but not the universe of all underwriters. The number of days spent in registration is not significant.

The main result, a positive coefficient for UPDATE, is consistent with the book-building explanation for IPO allocations. Benveniste and Spindt (1989) argue that underwriters give more shares to institutions in issues with stronger pre-market interest as an incentive for institutional investors to truthfully reveal their favorable information. Extraction of such information allows the underwriter to set a higher offer price for the issue. This is what we observe empirically.

C. Institutional Allocation and Degree of Underpricing

Section B documents that one source of superior profits to institutions is greater allocations in IPOs with strong pre-market demand. In this section, we examine whether this is the sole explanation for the better performance of institutions, or whether institutional allocation is related to underpricing even after controlling for pre-market demand. If so, the better performance of institutional investors in IPOs would reflect not merely allocations in "hotter'' issues with better pre-market demand, but would also reflect private information that is not captured by publicly known variables at the time of the IPO.

Panel A of Table IV reports estimates of a regression in which the dependent variable is the day 1 return of an IPO and independent variables include institutional allocation along with

control variables. First among our controls is the variable UPDATE, the percentage difference between the midpoint of the filing range and the offer price. This variable is an important control as we are primarily interested in testing whether allocation is related to the degree of IPO underpricing even after controlling for UPDATE. Among the other controls are variables that might potentially explain IPO underpricing. Beatty and Ritter (1986) document that issue proceeds are negatively related to the degree of underpricing of an issue. As before, we use the natural logarithm of the number of shares offered in the empirical specification. We include the time spent in registration and underwriter reputation as additional controls potentially related to IPO underpricing. Finally, we include but do not report industry dummy variables based on one-digit SIC codes.

Panel A in Table IV reports the univariate and multivariate regression estimates. On a standalone basis in the univariate specification, institutional allocation has a positive coefficient and is statistically significant. Among the controls in the multivariate specification, log number of shares has a negative coefficient and underwriter reputation has a positive coefficient. The variable UPDATE has a significant and positive coefficient, indicating that IPOs offered at the top of the filing range are indeed more likely to have higher day 1 returns. The time spent in registration is not significant. Institutional allocation retains a positive coefficient even after including UPDATE and the coefficient magnitude remains roughly equal to that in the univariate specification. The coefficient for allocation is also economically significant. For instance, using the Panel A estimates, a change in allocation from its first quartile to its third quartile, 64.95% to 81.44%, increases expected IPO underpricing by 5.12%.

For robustness, Panel B also reports estimates of an ordered probit specification in which the left-hand side dependent variable is an ordinal variable denoting whether an IPO was overpriced, moderately underpriced, or highly underpriced. The lowest category consists of

overpriced issues that have negative or zero first day returns. The next category consists of moderately underpriced issues that have returns between 0% and 20%, and the last category of IPOs includes highly underpriced issues that have day 1 returns in excess of 20%. Allocation remains significantly positively related to initial IPO returns even after including other controls potentially related to IPO underpricing.

The sign and significance of institutional allocations in the multivariate regressions suggests that it is not merely a proxy for publicly available information at the time of the offering. Institutional money appears to contain private information about future IPO returns. Such private information may well reflect superior information held by institutional investors, which allows them to minimize participation in the "lemons" in the IPO market, consistent with the Rock (1986) model of IPO underpricing and the empirical literature supporting these theories (e.g., Beatty and Ritter, 1986; Carter and Manaster, 1990; Michaely and Shaw, 1994; Jegadeesh, Weinstein and Welch. 1993). As this literature suggests, if institutions have private information, the aggregate demand flow from institutions is greater in more underpriced issues, and underwriters may allocate them a greater number of shares in these issues. In contrast, institutional demand and participation are lower in the "lemons.'' Alternatively, private information may be held by underwriters rather than by institutional investors, and underwriters may use this information to ensure that institutions get less of the worse performing shares.

D. The Economic Magnitude of Return Differences

Next, we provide an *economic* characterization of the institutional-retail differential in IPOs. To this end, we examine whether each dollar invested by an institutional investor earns the same as each dollar invested by a retail investor. We define the return on each dollar

invested by each type of investor, say p_t, where t is the investor type, institutional (t=1) or retail (t=2), as,

$$p_t = \frac{\sum_{i=1}^{n} x_{it} * p_i * r_i}{\sum_{i=1}^{n} x_{it} * p_i} \quad (1)$$

where, i indexes the issue, x_{it} denotes the percentage of issue i allocated to investor of type t, p_i, denotes the proceeds, and r_i is the first-day return for issue i.

Equation (1) provides a simple metric for judging the performance of institutional versus retail capital: the returns to each type of dollar invested in IPOs. If allocation $x_{it} = x_{jt} \forall i$, or more generally, if IPO allocation is independent of ex-post issue returns r_i, then $p_1 = p_2$ and both types of capital will experience the same returns on investment. On the other hand, if institutional allocation tends to be high for more underpriced issues, i.e., $\partial x_1/\partial r_1 > 0$, then $p_1 > p_2$. In our sample, the total amount invested by institutions is $16.4 billion and the total amount earned by institutions equals $2.57 billion, so the return to one institutional dollar is 15.69%. On the other hand, retail investors earn only 13.92%, investing a total of $6.59 billion for a first-day profit of $918 million. Therefore, an institutional dollar earns about 1.77% more than a retail dollar for the IPOs in our sample based on day 1 returns of IPOs.

The first-day return difference of 1.77% is somewhat modest. Why is it so narrow? Differences in returns are certainly likely to be lower than the differences in dollar profits reported in Table II, because capital invested by retail investors is only about a third of that invested by institutional investors. The allocation data from Table II provide additional pointers. From the allocation statistics, the major variation in institutional allocation across IPOs comes from the fact that institutions have fewer shares in IPOs that are overpriced *ex-*

post. While there is some variation in institutional allocation *within* the universe of underpriced issues, it is small in relation to the variation between all underpriced and overpriced IPOs. Thus, the contribution of returns from underpriced issues to an institutional-retail return differential is economically small, and the difference is driven by variation due to overpriced issues. This component is small due to two reasons. First, IPOs are underpriced rather than overpriced on average. Additionally, overpriced issues tend to have lower dollar proceeds and therefore contribute less to the overall dollars invested in IPOs.[10] Hence, the cumulative impact of overpriced issues on the overall returns is also small.

As discussed earlier in Section A, the existence of price support biases estimates of day 1 returns upwards. Losses on overpriced issues may be greater without price support. Additionally, profit and return differentials based on day 1 returns exclude the sample of 22 IPOs that have zero first-day returns. Therefore, we also compute return differentials based on the longer horizons of 10 and 20 trading days, following Panels B and C of Table II. As expected, return differentials between institutions and retail customers widen when considering these longer horizons. Over 10 trading days, institutions earn 15.10% while retail investors earn 13% on their invested capital, giving a return differential of 2.10%. Over the 20 trading day horizon, the differentials widen somewhat to 2.39%, as institutions earn a return on capital invested of 15.87% while retail investors earn 13.48%.

We have provided evidence on whether institutional capital performs better in IPOs compared to retail investors and why. We find that institutions do tend to earn more than retail investors in IPOs. Part of the explanation is the positive correlation between pre-market demand and allocation, consistent with the book-building hypothesis of Benveniste and Spindt

[10] Negative return IPOs tend to issue fewer shares and have lower offer prices compared to other IPOs. These issues have mean (median) number of shares offered of 4.36 mm (3.19 mm) versus 7.47 mm (4.50 mm) for the full sample, while their mean and median offer price equal $12.50 ($12.50) versus $15.09 ($15) for the full sample.

(1989). However, institutional allocation also appears to reflect private information not in pre-market demand, suggesting that either institutions are privately informed investors (Rock, 1986) or that underwriters use their private information to favor institutions for reasons beyond book-building.

III. Two Stage Estimates

The results in Table IV indicate that the day 1 return of an IPO is positively related to institutional allocation. This positive relation may reflect one or both of two explanations. First, institutional allocation may contain private information about day 1 returns not reflected in the price update and other explanatory variables related to day 1 returns. Alternatively, this positive relation may be driven by the endogeneity of institutional allocation. We know from Hanley (1993) that initial returns and UPDATE are positively related, and from Table III that institutional allocation is positively related to UPDATE because underwriters give more shares to institutions when pre-market demand is high. Thus, the allocation-return relationship may reflect the endogenous nature of institutional allocation rather than any private information about returns it contains. We consider two-stage estimates to explicitly separate out the effect of the endogenously determined portion of the institutional allocation on the initial IPO returns.

To model the endogenous nature of institutional allocation, rewrite the models estimated in Tables 3-4 as

$$E(RETURN) = \hat{a}\, X_{RETURN} + \grave{e}\, INST \qquad (2)$$

$$E(INST) = \acute{a}\, X_{INST} \qquad (3)$$

where *INST* and *RETURN* denote institutional allocation and day 1 returns, respectively and the X's denote the regressors associated with the two equations. The key issue is whether the significance of institutional allocation *INST* in Eq. (2) is merely because *INST* is an endogenous function of the variable X_{INST}.

We can test if there is an endogeneity bias by entering the endogenous portion of institutional allocation *INST* rather than *INST* itself as a regressor to explain day 1 IPO returns. Equivalently, rewrite Eq. (2) as

$$E(RETURN) = â X_{RETURN} + è_1 [á X_{INST}] \quad (4)$$

If the endogeneity hypothesis is correct, we would expect that $è_1$ is positive and significant in Eq. (4). The specification can be estimated by two-stage least squares (2SLS) methods. In the first step, institutional allocation is regressed on UPDATE and other regressors in X_{INST}. Fitted values from this regression [$á X_{INST}$] are then entered into the return equation instead of institutional allocation INST and the specification is estimated. Standard errors need adjustments because we use generated regressors in the second step of the two-step procedure (see, e.g., Murphy and Topel (1985) or Maddala (1983), Chapter 8). In addition, if institutional allocation has private information not reflected in other public variables, *excess* allocation should itself explain day 1 returns. This suggests generalizing Eq. (4) to incorporate excess allocation, i.e., estimating

$$E(RETURN) = â X_{RETURN} + è_1 [á X_{INST}] + è_2 [INST - á X_{INST}] \quad (5)$$

A positive and significant $è_2$ would support the private information hypothesis while a positive and significant $è_1$ would reflect the existence of an endogeneity bias.[11]

Estimating the two equation system (3)-(5) requires us to specify regressors that enter either equation. If, as in Tables 3-4, the same regressors enter the returns and allocation equations, i.e., $X_{RETURN} = X_{INST}$, the equation-by-equation OLS coefficient è for institutional allocation *INST* in Eq. (4) is the same as regression coefficient $è_2$ for excess institutional allocation. Thus, the significance of the coefficient for *INST* in the ordinary least square results reported in Table IV, where $X_{RETURN} = X_{INST}$, can be interpreted as evidence that institutional allocation has private information about day 1 returns. The same results obtain if X_{INST} were to be a subset of X_{RETURN} rather than being identical to X_{RETURN}. Thus, non-OLS structural estimates of Eqs. (3)-(4) are only needed when there is at least one variable in the allocation equation (3) that does not enter into the returns equation (4).[12]

We can specify an extra variable in the allocation equation by arbitrarily excluding one or more regressors from the return equation (5) but including these variables in the allocation equation (4). However, our strategy is to look outside the set of variables in Tables (3)-(4) to avoid biases induced by specification searches (e.g., Lo and MacKinlay, 1990). We include the size of the underwriting syndicate (NSYNDICATE), the field NUMAMGR in the SDC New Issues database, as a potential determinant of the fraction of the issue allocated to institutions. We conjecture that there exists a negative relation between the institutional component of an issue and the syndicate size. The reasoning is that retail investors are more likely to have

[11] Eq. (5) has more information than 2SLS, i.e., Eq. (4), due to the extra term (INST – á X_{INST}). However, this term is orthogonal to other included variables (it is a regression error), and does not affect other coefficient estimates.

[12] When such a variable identifies the structural system, OLS is biased. The nature of such a bias can be characterized analytically. These results are not reported here but are available upon request.

relationships and accounts with one or very few firms, while institutions are likely to have ongoing relationships with multiple underwriters. Thus, issues with a more significant retail component require more extensive distribution efforts in order to involve more retail customers and would probably involve more underwriters being included in the syndicate, a view also borne out by informal conversations with underwriters. This suggests a negative relation between the syndicate size and the institutional allocation of an issue. The correlation between the two variables is -0.46.

Table V presents the two-stage estimates. As before in Table IV, we present estimates when the day 1 return is specified as a continuous variable, and also a specification in which it is an ordinal variable. Panel A reports estimates of the allocation equation (3). As expected, the syndicate size has a negative and significant coefficient, suggesting that issues with more retail (less institutional) allocation have a greater number of managers. Panels B and C of Table V reports the second stage estimates of return equation (4) based on an ordered probit model and OLS, as before. In both specifications, fitted institutional allocation is not significant, suggesting that the endogenous portion of institutional allocation is not significantly related to day 1 returns. Thus, the positive relation between institutional allocation and day 1 IPO returns does not reflect the fact that allocation itself is related to other publicly available information. Allocation appears to have private information about day 1 returns, consistent with which the coefficient for excess allocation is positive and significant. Unusually high institutional allocation in IPOs is associated with positive day 1 returns.

IV. Summary and Conclusions

The fact that IPOs are underpriced is widely known and extensively documented. However, there is little empirical evidence on how the day 1 gains in IPOs are allocated

between institutional and retail investors. The question of whether IPO allocation practices systematically favor institutions over retail investors is also a subject of much debate and ongoing regulatory investigations. Using a new dataset, we examine patterns of institutional allocation in IPOs.

Our analysis consists of two parts. The first part of the analysis investigates the cross-sectional variation of institutional allocation in IPOs, and examines whether institutions do in fact have higher allocation in the more underpriced issues. We find this is indeed the case, and document that there is a positive relationship between institutional allocation and underpricing.

The next part of our analysis examines alternate explanations for why institutional allocation is greater in underpriced issues. One explanation for this result comes from the book-building theories of IPO underpricing, which suggest that underwriters attempt to extract favorable pre-market demand information to help partially adjust the offer price upwards to the high end of the filing range. In such theories, underwriters allocate more shares in issues with strong pre-market demand, which are also more likely to have higher first day returns, as a quid pro quo for obtaining favorable pre-market demand information. A second explanation is that institutional allocation is positively related to IPO underpricing because of private information. Such information can be held by institutions, so that they participate less in lemons, or by underwriters who use this information to ensure that institutions get less of the worse performing issues. We find support for both explanations.

Our results have implications for the ongoing debate regarding allocation practices followed by U.S. underwriters. A key question in this debate is whether institutions are favored in the IPO allocation process. Our evidence is certainly consistent with this view. We find that institutions do tend to concentrate more in better performing IPOs. Part of this result is because institutions get favorable allocations in IPOs with strong pre-market demand, which may be

economically justified from a firm's viewpoint as quid pro quo to institutions for information that allows underwriters to set higher prices for the IPO. However, we find that institutional allocation is related to IPO underpricing beyond what can be explained by pre-market demand. This suggests that there is private information, either with institutions or with underwriters, that benefits institutional investors in IPOs. Thus, while book-building is important, institutional allocation in underpriced IPOs is in excess of that explained by book-building alone.

REFERENCES

Aggarwal, Reena, 2000, Stabilization activities by underwriters after new offerings, *Journal of Finance* 55, 1075-1104.

Beatty, Randolph and Jay Ritter, 1986, "Investment banking, reputation, and the underpricing of initial public offerings," *Journal of Financial Economics* 15, 213-232.

Benveniste, Lawrence M. and Paul A. Spindt, 1989, "How investment banks determine the offer price and allocation of new issues," *Journal of Financial Economics* 24, 343-362.

Carter, Richard and Steven Manaster, 1990, "Initial public offerings and underwriter reputation," *Journal of Finance* 45, 1045-1067.

Chen, Hsuan-Chi and Jay Ritter, 2000, "The seven percent solution," *Journal of Finance* 55, 1105-1132.

Cornelli, Francesca, and David Goldreich, 2001, "Book-building and strategic allocation," forthcoming, *Journal of Finance*.

Ellis, Katrina, Roni Michaely, and Maureen O'Hara, 2000, "When the underwriter is the market maker: An examination of trading in the IPO aftermarket," *Journal of Finance* 55, 1039-1074.

Habib, Michel A. and Alexander P. Ljungqvist, 1998, "Underpricing and IPO proceeds: A Note," *Economics Letters* 61, 381-383.

Habib, Michel A. and Alexander P. Ljungqvist, 2001, "Underpricing and entrepreneurial wealth losses in IPOs: Theory and evidence," *Review of Financial Studies* 14, 433-458.

Hanley, Kathleen W., 1993, "The underpricing of initial public offerings and the partial adjustment phenomenon," *Journal of Financial Economics* 34, 231-250.

Hanley, Kathleen W. and William J. Wilhelm, 1995, "Evidence on the strategic allocation of initial public offerings," *Journal of Financial Economics* 37, 239-257.

Hansen, Robert, 2000, "Do investment banks compete in IPOs?: The advent of the '7% plus contract'," *Journal of Financial Economics* 59, 313-346.

Jegadeesh, Narasimhan, Mark Weinstein, and Ivo Welch, 1993, "IPO signaling and subsequent equity offerings: An empirical investigation," *Journal of Financial Economics* 34, 153-176.

Ljungqvist, Alexander, William J. Wilhelm, 2001, IPO allocations: Discriminatory or discretionary? Working Paper, New York University.

Lo, Andrew, and A. Craig MacKinlay, 1990, "Data snooping biases in tests of asset pricing models," *Review of Financial Studies* 3, 431-467.

Loughran, Tim, Jay Ritter, and Kristian Rydqvist, 1994, "Initial public offerings: International insights," *Pacific-Basin Finance Journal* 2, 165-199.

Loughran, Tim, and Jay Ritter, 2001, "Why don't issuers get upset about leaving money on the table in IPOs?" forthcoming, *Review of Financial Studies*.

Lowry, Michelle, and G. William Schwert, 2001, "IPO market cycles: bubbles or sequential learning?" forthcoming, *Journal of Finance*.

Maddala, G., 1983, *Limited Dependent and Qualitative Variables in Econometrics* (Cambridge University Press, New York, NY).

Michaely, Roni, and Wayne H. Shaw, 1994, "The pricing of initial public offerings: Tests of adverse selection and signaling theories," *Review of Financial Studies* 7, 279-319.

Megginson, William and Kathleen A. Weiss, 1991, "Venture capitalist certification in initial public offerings," *Journal of Finance* 46, 879-903.

Murphy, K., and R. Topel, 1985, Estimation and inference in two step econometric models," *Journal of Business and Economic Statistics* 3, 370-379

Ritter, Jay, 1998, "Initial public offerings," *Contemporary Finance Digest* 2, 5-30.

Rock, Kevin, 1986, "Why new issues are underpriced," *Journal of Financial Economics* 15, 187-212.

Table I
Descriptive Statistics for Sample

The table reports the mean and median of several characteristics of IPOs offered between May 1997 and June 1998. Columns 2 and 3 report sample characteristics of 174 IPOs managed by nine underwriters for which institutional allocation is available. Columns 4 and 5 report characteristics of the population of 617 IPOs offered during this time period, which includes all firm-commitment IPOs in the SDC database except for American Depositary Receipts, unit offerings, closed-end funds and real estate investment trusts. Proceeds represent the amount raised (in $ million); assets denote the value of the issuer's assets before the offer (in $ million); shares offered are in millions; the offer price is the price at which the issue if offered; initial return is the percentage return on the IPO from the offer price to the IPO's closing price on the first day it is traded; UPDATE is the percentage difference between the midpoint of the filing range and the offer price; Days in registration denotes the number of days between the prospectus filing with SEC and the final offer; Syndicate size denotes the number of members in the underwriting syndicate (variable NUMAMGR in the SDC New Issues database); and % reputed managers denotes the percentage of IPOs offered by underwriters in the top ten in the period. Institutional allocation is the percentage of the IPO issue allocated to institutional investors. Allocation data were reported by the IPO book manager.

Characteristic	Sample (N = 174)		Population (N = 617)	
	Mean	Median	Mean	Median
Proceeds (in $ million)	$132.2	$63.9	$75.55	$36.00
Assets	$75.95	$1,030	$31.6	$435.7
Shares Offered	7.47	4.50	6.07	3.13
Offer Price	$15.09	$15.00	$12.37	$12.00
UPDATE	1.10%	0.00%	0.09%	0.00%
Days in Registration	78.72	69.00	96.50	74.50
Syndicate Size	16.01	16	15.25	16
% Reputed Managers	65%	-	43%	-
Initial Return	19.25%	12.80%	14.27%	8.98%
Institutional Allocation	72.77%	74.26%	-	-

Table II
Allocations and Profits of Institutional and Retail Investors

The table reports mean and median (in parentheses) initial returns, proceeds in millions of dollars, and percentage of an IPO allocated to institutional investors. We also report the hypothetical profits to institutional and retail investors from investing in the issue at the offer price and selling it on trading day 1, trading day 10, and trading day 20 after the offer date. We report the data for three sets of IPOs: returns less than zero, returns between 0% and 20%, and returns exceeding 20%, as well as aggregate data for all IPOs. We do not report the profitability numbers for IPOs with zero returns (22 on day 1 and 1 on day 10) because profits for these IPOs are mechanically equal to zero by definition. Profit numbers are in millions of dollars. The data consist of 174 IPOs offered between May 1997 and June 1998 for which institutional allocation is available.

Variable	All IPOs	Return < 0%	0 < Return ≤ 20%	Return >20%
Panel A: Profits based on returns from offer to close of trading day 1				
Sample Size	174	8	84	60
Profits per issue – Institutional	$14.79 ($6.61)	-$1.92 (-$1.30)	$11.31 ($4.59)	$27.32 ($18.37)
Profits per issue – Retail	$5.28 ($2.29)	-$1.77 (-$0.82)	$4.20 ($1.95)	$9.66 ($6.09)
Panel B: Profits based on returns from offer to trading day 10				
Sample Size	174	30	78	65
Profits per issue – Institutional	$14.24 ($6.84)	-$5.34 (-$2.33)	$11.63 ($4.24)	$26.63 ($18.64)
Profits per issue – Retail	$4.93 ($2.52)	-$2.82 (- $1.03)	$3.94 ($1.22)	$9.78 ($6.77)
Panel C: Profits based on returns from offer to trading day 20				
Sample Size	174	48	49	77
Profits per issue – Institutional	$14.96 ($7.04)	-$6.81 (- $2.99)	$8.73 ($4.73)	$32.48 ($19.11)
Profits per issue – Retail	$5.11 ($1.89)	-$3.37 (-$0.94)	$3.30 ($1.51)	$11.54 ($6.86)
Panel D: Descriptive Statistics				
Day 1 Returns	19.25% (12.80%)	-5.78% -5.96%	9.28% (9.00%)	$43.61 ($32.24)
Proceeds (in millions)	$132.20 ($63.90)	$57.78 ($39.95)	$162.10 ($71.22)	$106.90 ($63.27)
Institutional Allocation	72.77% (74.26%)	59.73% (56.09%)	71.65% (72.87%)	76.69% (75.87%)

Table III
Institutional Allocation & Pre-Market Demand Indications

The table reports estimates of a univariate and a multivariate regression for 174 IPOs offered between May 1997 and June 1998 for which institutional allocation is available. The dependent variable is the percentage of the IPO allocated to institutional investors. Independent variables include the percentage difference between the midpoint of the filing range and the offer price (UPDATE), the natural logarithm of the number of shares offered in millions (LOGSHARES), a reputation dummy which is 1 if the underwriter is among the top ten in terms of market share and zero otherwise (REPUTED), and the days spent in the registration process (DAYS). Industry dummies based on one-digit SIC codes are included as control variables but not reported in the table. *t*-statistics based on White (1980) heteroskedasticity-consistent standard errors are in parentheses.

Dependent Variable: Percentage of IPO Allocated to Institutions		
	Model 1	Model 2
Intercept	71.88* (21.58)	75.30* (3.39)
UPDATE	0.16* (2.02)	0.35* (4.64)
LOGSHARES		0.17 (0.12)
REPUTED		-13.03* (-6.32)
DAYS		0.01 (0.42)
Adjusted R-squared	9.22%	27.01%

* significant at the 5 percent level using a two-tailed test.

Table IV
Institutional Allocation & Underpricing

The table reports OLS and ordered probit estimates for a sample of 174 IPOs offered between May 1997 and June 1998 for which institutional allocation is available. In OLS, the dependent variable is R, where R is the day 1 return of the IPO. In the ordered probit, the dependent variable is 0 if $R \leq 0$, 1 if $0 < R \leq 20\%$, 2 if $R > 20\%$, where R is the day 1 return for the IPO. Independent variables include the percentage of the IPO allocated to institutional investors (INST), the natural logarithm of the number of shares offered (LOGSHARES), the percentage difference between the midpoint of the filing range and the offer price (UPDATE), a reputation dummy, which is 1 if the underwriter is among the top ten in terms of market share and zero otherwise (REPUTED), and the days spent in the registration process (DAYS). Industry dummies based on one-digit SIC codes are included in the regression but not reported in the table. *t*-statistics, based on White (1980) heteroskedasticity-consistent standard errors for OLS and Maddala (1983, Chapter 2) for the ordered probit model, are in parentheses.

	Panel A: Ordinary Least Squares Dependent Variable: Day 1 Return		Panel B: Ordered Probit Dependent Variable: 0 if $R \leq 0\%$, 1 if $0< R \leq 20\%$, 2 if $R > 20\%$	
	Model 1	Model 2	Model 3	Model 4
Intercept	-1.69	108.97*	-0.27	2.06
	(-0.19)	(2.91)	(-1.72)	(0.74)
INST	0.30*	0.31*	0.02*	0.02*
	(3.05)	(2.62)	(2.46)	(2.46)
LOGSHARES		-7.54*		-0.16
		(-3.06)		(-0.90)
UPDATE		0.75*		0.05*
		(4.45)		(6.37)
REPUTED		12.09*		0.57*
		(3.09)		(2.08)
DAYS		0.01		0.003
		(0.02)		(0.10)
pseudo R^2 (Ordered Probit) or Adj. R^2 (OLS)	6.53%	30.13%	5.21%	20.51%

* significant at the 5 percent level using a two-tailed test.

Table V
Institutional Allocation & Underpricing: Two-Stage Estimates

The table reports estimates of two-equation systems for a sample of 174 IPOs offered between May 1997 and June 1998 for which institutional allocation is available. In each system, equation A consists of the regression of institutional allocation on several variables $\underline{x}$ including the natural logarithm of the number of shares offered (LOGSHARES), the percentage difference between the midpoint of the filing range and the offer price (UPDATE), a reputation dummy which is 1 if the underwriter is among the top ten in terms of market share and zero otherwise (REPUTED), the days spent in the registration process (DAYS) and the number of underwriters in the syndicate (NSYNDICATE). In equation B, the dependent variable is either the day 1 return of the IPO (R) for OLS estimates, or it equals 0 if $R \leq 0$, 1 if $0 < R$ 20%, 2 if $R > 20\%$. The independent variables include the fitted value and residuals from equation A and other firm-specific variables. Industry dummies based on one-digit SIC codes are included in the regression but not reported in the table. *t*-statistics are in parentheses.

	Equation A	**Equation B**	
	Dependent Variable: Institutional Allocation (%)	Ordinary Least Squares Dependent Variable: Day 1 Return (%)	Ordered Probit Dependent Variable: 0 if $R \leq 0$, 1 if $0 < R \leq 20\%$, 2 if $R > 20\%$
Intercept	69.95*	-75.63*	2.60*
	(19.71)	(-2.83)	(0.69)
Fitted Allocation		0.63	0.02
		(1.53)	(0.44)
Excess Allocation		0.28*	0.02*
		(2.35)	(2.38)
LOGSHARES	0.93	-7.59*	-0.15
	(0.73)	(-2.92)	(-0.84)
UPDATE	0.34*	0.64*	0.05*
	(4.48)	(3.28)	(3.78)
REPUTED	-11.70*	16.26*	0.44
	(-5.40)	(2.37)	(0.83)
DAYS	0.01	-0.002	0.002
	(0.44)	(-0.09)	(0.09)
NSYNDICATE	-0.38*		
	(-3.52)		
pseudo R^2 (Ordered Probit) or Adjusted R^2 (for OLS)	32.52%	29.85%	24.51%

* significant at the 5 percent level using a two-tailed test.