The Role of Institutional Investors in Initial Public Offerings

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Abstract

The theoretical literature on IPOs has long argued that institutional investors possess private information about IPOs, and that underpricing is a mechanism for compensating them to reveal this private information. In this paper, we use a large sample of transaction-level institutional trading data to study whether institutions indeed have private information about IPOs, and are able to realize significant profits from their participation in IPOs. We also study whether institutional investors are able to retain a residual informational advantage over retail investors in post-IPO trading. We therefore analyze the pattern and profitability of institutional IPO allocation sales, the profitability of post-IPO institutional trading, and the predictive power of institutional trading for subsequent long-run IPO performance. We find that institutions sell 70.2 percent of their IPO allocations in the first year, fully realize the "money left on the table," and do not dissipate these profits in post-IPO trading. Further, institutional trading has predictive power for long-run IPO performance, even after controlling for publicly available information, though this predictive power decays over time. Overall, our results suggest that institutional investors possess significant private information about IPOs, receive considerable compensation for participating in these IPOs, and retain a residual informational advantage in post-IPO trading.

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1. Introduction

Starting with the Rock (1986) model, institutional investors have played an important role in the theoretical literature on the pricing and allocation of initial public offerings (IPOs). Rock (1986) argues that these institutional investors with private information about the true long-run value of the shares of firms going public bid only on undervalued shares, leaving retail investors with a disproportionate share of overvalued IPOs. Thus, in the Rock (1986) setting, IPO underpricing is a mechanism to mitigate the adverse selection faced by retail investors, ensuring that they do not withdraw from the IPO market. A second strand of the literature is the bookbuilding literature (e.g., Benveniste and Spindt (1989)), which builds on the Rock (1986) assumption of informed institutional investors, and argues that the IPO bookbuilding process is a mechanism for extracting information from these institutional investors in order to use it to price shares in the IPO at the appropriate level. In their setting, underpricing is a means of compensating these institutional investors for truthfully revealing all value-relevant information useful in pricing shares in the IPO. A third strand of the literature (e.g., Chemmanur (1993)) views underpricing as a way of inducing information production by institutional and other investors about the firm going public. This information is reflected in the secondary market price of the firm's equity as a result of post-IPO trading by these informed investors, moving it closer to the firm's intrinsic value.[1]

Motivated by the above theoretical literature, in this paper we address the following empirical questions for the first time in the literature. First, do institutional investors really have private information about IPOs? Further, if indeed they possess private information, is all their value-relevant information incorporated into the IPO offer price, or are institutional investors left with residual information that they can profitably use in post-IPO trading? Second, are institutional investors able to realize significant profits from their participation in IPOs, thus getting compensated for the role they play in the IPO process, as postulated by the bookbuilding literature? While it has been documented (see, e.g., Aggarwal, Prabhala, and Puri (2002), and Hanley and Wilhelm (1995)) that institutional investors receive significant allocations in underpriced IPOs (where a considerable amount of money is "left on the table"),

[1] See Ritter and Welch (2002) for an excellent review of related theoretical and empirical literature on IPOs.

the ability of institutions to fully realize this money left on the table has not been studied. A related question is whether, even if institutions realize superior profits from selling their IPO allocations, they dissipate these profits (partially or fully) in post-IPO trading.[2] Finally, how do institutions sell their IPO share allocations? While it has been documented that institutions sell about 25.8 percent of the shares allocated to them during the first two days of post-IPO trading (Aggarwal (2003)), the selling of IPO allocations by institutions beyond the immediate post-IPO period has not been studied. The answer to this question is not only important in its own right (since it has implications for the desirability of institutions as investors in IPOs), but is also essential to establish the amount of profits realized by institutions from their participation in IPOs.[3]

We answer the above questions in reverse order, and organize our empirical analysis into four parts. First, we study the pattern of institutional sales of their IPO allocations over the long run post-IPO. Second, we analyze the realized profitability of these institutional IPO allocation sales. This allows us to assess the extent of compensation that institutions actually receive for their participation in IPOs. Third, we examine the profitability of post-IPO institutional trading (i.e., profits from buying and selling shares in the secondary market alone). Fourth, we analyze the relation between institutional trading and subsequent long-run IPO performance. The latter two parts of our study allow us to answer the questions discussed earlier regarding the nature of the private information held by institutional investors.

In this paper, we make use of a large sample of proprietary transaction-level institutional trading data to answer the above questions. Our sample includes transactions from January 1999 to December

[2] This question has become particularly important in light of allegations of "laddering," where institutions precommit to the underwriter to buy additional shares of equity in IPOs firms in the secondary market, in exchange for receiving larger IPO allocations in these firms (see, e.g., "Trade-offs: seeking IPO shares, investors offer to buy more in after-market" by Susan Pulliam and Randall Smith in the *Wall Street Journal*, December 6, 2000). In their theoretical model, Fulghieri and Spiegel (1993) argue that investment banks may use share allocations in underpriced IPOs to reward institutional investors in return for fees from other (non-underwriting) businesses. See also Loughran and Ritter (2002) for a similar argument.

[3] In particular, while institutional investors can fully realize all the money left on the table if they are able to sell their entire IPO allocation at the first-day closing price, it is well known that underwriters actively discourage them from doing so using various mechanisms, for example, penalty bids or reducing future IPO allocations (Ritter and Welch (2002) and Loughran and Ritter (2004)). Clearly, if institutions cannot sell their allocations immediately after the IPO, then their realized profits may be significantly lower than the money left on the table, since IPOs underperform in the long run (see, e.g., Ritter (1991) and Ritter and Welch (2002)).

2004 originated from 419 different institutions with total annualized principal traded of $4.4 trillion. For an average IPO, our sample institutions collectively account for 11.2 percent of total trading volume reported in CRSP within the first year post-IPO. With this dataset, we are able to track institutional trading in 909 IPOs from January 1999 to December 2003 for one full year post-IPO. We identify IPO allocation sales and separate institutional IPO trading into two categories, namely, institutional IPO allocation sales and post-IPO institutional trading. This allows us to analyze them separately. Further, in order to infer institutional IPO allocations, we identify a subset of our sample institutions by matching with the Spectrum quarterly institutional holdings data.[4] For these identified institutions, we are able to compute their IPO allocations by combining our institutional trading data with quarterly holdings data reported by them. Therefore, we use the sub-sample of these identified institutions to study the long-run pattern and realized profitability of institutional IPO allocation sales (the first and second parts discussed above), and use all our sample institutions to study the profitability of post-IPO institutional trading and the predictability of institutional trading in IPOs (the third and fourth parts discussed above).

We present a number of new results on IPOs and institutional trading. In the first part of our analysis, we document the pattern of institutional IPO allocation sales over the long run post-IPO. We find that flipping during the first two trading days post-IPO constitutes 21.8 percent of their IPO allocations, similar to the findings in the prior literature. We present the first evidence in the literature on how institutions sell their IPO allocations in the long run. Within the first year, institutions sell 70.2 percent of their IPO allocations. In other words, institutions continue to sell significant portions of their IPO allocations beyond the immediate post-IPO period. Institutional IPO allocation sales drop sharply after month 1 and there is no spike in month 2, after underwriters stop monitoring investors' flipping activities, which usually occurs at the end of month 1. We interpret this result as evidence that underwriters' monitoring mechanism for flipping does not appear to be very binding for institutions.

[4] Though the number of identified institutions is relatively small, they are larger on average, and collectively account for 8.7 percent of total trading volume reported in CRSP within the first year post-IPO. In other words, these 48 identified institutions account for 77.7 percent (8.7 percent / 11.2 percent) of trading in IPOs done by all our 419 sample institutions. Therefore, we do not lose much information by conducting our study of IPO allocations and allocation sales using the sub-sample of these 48 identified institutions.

Institutions hold their IPO allocations for 9.65 months on average. We find that institutions sell hotter (more underpriced) IPOs, younger IPOs, high-tech IPOs, IPOs with lockup provisions, and IPOs with poorer long-run performance faster.

In the second part of our analysis, we study the *realized* profitability of institutional IPO allocation sales, using actual transaction prices, and incorporating the impact of trading commissions and implicit trading costs. We document that institutional IPO allocation sales are highly profitable and institutions fully realize the money left on the table for their IPO allocations, both before and after accounting for risk factors. Sample institutions were able to realize 73.7 percent in terms of raw returns and 67.0 percent in terms of abnormal returns on their IPO allocation sales. By selling their IPO allocations, sample institutions collectively made $10.3 billion in raw profits and $9.4 billion in abnormal profits.

In the third part of our analysis, we study the profitability of post-IPO trading by institutional investors. Post-IPO institutional trading outperforms a buy-and-hold investment strategy in IPOs, suggesting that institutions continue to possess private information about IPO firms even after the IPO. Institutions are able to outperform more when there is higher information asymmetry about the IPO firm, namely younger IPOs and IPOs underwritten by less reputable investment banks. However, institutions' post-IPO trading does not outperform or underperform the market in general. Larger institutions outperform a buy-and-hold strategy in IPOs by a higher margin than smaller institutions, after controlling for other factors.

In the fourth and final part of our analysis, we study the predictive power of institutional trading on subsequent long-run IPO performance. We document that institutional trading has predictive power for subsequent long-run IPO performance, even after controlling for publicly available information. However, the predictive power decays over time, becoming insignificant after the initial three to four months. After a company goes public, it has to make a significant amount of information publicly available (e.g., audited financial statements), which reduces outsiders' cost of information production. Therefore, our results suggest that institutions have a greater informational advantage over retail investors

when the cost of producing information is higher, i.e., during the immediate post-IPO period. Institutions gradually lose their informational advantage as more and more information about the IPO firm becomes publicly available. We also find that trading by large institutions has more predictive power, after controlling for publicly available information.

Our paper considerably enhances our understanding of the role of institutional investors in IPOs. Our results indicate that, consistent with information production theories, institutional investors are able to generate superior information about IPOs. Further, we document that, as assumed by Rock (1986), institutional investors possess an informational advantage over retail investors, enabling them to select better performing IPOs. We also show that institutional investors are able to realize significant abnormal profits from IPO allocations. In particular, they are able to fully realize the money left on the table for their IPO allocations. Overall, institutional investors receive considerable compensation for participating in IPOs, broadly consistent with the implications of bookbuilding theories (e.g., Benveniste and Spindt (1989)). Finally, the fact that institutional trading in the months after the IPO has predictive power for subsequent long-run IPO returns indicates that institutional investors retain a residual informational advantage over retail investors even after the IPO. Thus, while underpricing indeed seems to be a way of compensating institutions for revealing their private information as predicted by bookbuilding theories, our results indicate that institutions do not reveal their entire private information at the time of the IPO. Consistent with this, the post-IPO trading of institutions is able to outperform a naive buy-and-hold strategy in IPOs, so that the superior profits institutions generate from their IPO allocation sales are not dissipated in post-IPO trading (allowing institutions to extract informational rents overall from investing in IPOs). Our results also show that larger institutions have a greater informational advantage relative to that of smaller institutions, indicating the existence of significant economies of scale in information production.

The remainder of this paper is organized as follows. Section 2 briefly reviews related literature. Section 3 describes our sample and presents summary statistics. Section 4 presents our results on the pattern of institutional IPO allocation sales. Sections 5 and 6 present our results on the profitability of

institutional IPO allocation sales and post-IPO institutional trading, respectively. Section 7 presents our results on the relation between institutional trading and subsequent long-run IPO performance. Section 8 concludes with a discussion of our results.

2. Related Literature

Krigman, Shaw, and Womack (1999) show that first-day block sales can predict long-run IPO performance. Our result on the predictive power of the first two days of institutional trading is thus consistent with theirs. However, there are important differences between our study and Krigman, Shaw, and Womack (1999), and we extend their long-run post-IPO return predictability results in several directions. First, in addition to institutional trading immediately after IPOs, we study the predictive power of subsequent institutional trading (up to one year post-IPO), and find that institutions' predictive power early on diminishes over time. Second, unlike their study, which infers institutional flipping by identifying block sales in the TAQ data, we use transaction-level institutional trading data that include the direction of each trade. It is widely known that the algorithm for inferring trade direction, while useful, is far from perfect. Third, we are able to study institutional trading even when their trades are not blocks, and find that even trades from small institutions have some predictive power. This is especially relevant given recent developments in trading such as program trading and decimalization, which have caused dramatic reductions in institutional trade sizes. Fourth, instead of flipping alone, we study institutional net buying (buying minus selling) in IPOs, and thus provide a more complete picture.[5]

Aggarwal (2003) studies IPO allocation and immediate flipping over the first two days after the IPO.[6] Boehmer, Boehmer, and Fishe (2006) study the relation between IPO allocation, flipping, and long-run IPO performance. Ellis, Michaely, and O'Hara (2000) and Ellis (2006) study aftermarket

[5] See also Field and Lowry (2005), who find, using quarterly institutional holdings data, that IPOs with higher institutional ownership soon after the offering date have better long-run returns. Our results suggest that one reason underlying this could be that institutions sell more IPOs with worse long-run performance and buy more IPOs with better long-run performance.

[6] There is a significant literature on IPO share allocation: see, e.g., Cornelli and Goldreich (2001) and Ljungqvist and Wilhelm (2002), who study share allocation in bookbuilding IPOs.

trading by market makers in IPOs.[7] While these papers focus on trading in the immediate post-IPO period (flipping), we characterize the pattern of institutional IPO allocation sales over the long run post-IPO.

3. Data and Summary Statistics

3.1. Institutional Trading Sample

We obtain proprietary transaction-level institutional trading data from the Abel/Noser Corporation, a leading execution quality measurement service provider for institutional investors. The data are similar in nature to those used by several other studies on institutional trading, for example, Keim and Madhavan (1995), Jones and Lipson (2001), Conrad, Johnson, and Wahal (2001), Goldstein, Irvine, Kandel, and Wiener (2008), Irvine, Lipson, and Puckett (2007), and Lipson and Puckett (2008).[8] This is the first paper to use institutional trading data to study institutional investors' trading behavior in IPOs.

The data cover equity trading transactions by a large sample of institutions from January 1999 to December 2004. For each transaction, the data include the date of the transaction, the stock traded (identified by both symbols and CUSIPs), the number of shares traded, the dollar principal traded, commissions paid by the institution, and whether it is a buy or sell by the institution. The data are provided to us under the condition that the names of all institutions are removed from the data. However, identification codes are provided enabling us to separately identify all institutions. Sample institutions are either investment managers or plan sponsors. Investment managers are mutual fund families such as Fidelity Investments, Putnam Investments, and Lazard Asset Management. Examples of pension plan sponsors include the California Public Employees' Retirement System (CalPERS), the Commonwealth of Virginia, and United Airlines.

[7] See also Griffin, Harris, and Topaloglu (2007), who study trading by clients through the lead underwriter immediately after an IPO, and investigate the reason for the predominance of buys over sells in such trading.

[8] The Abel/Noser Corporation has made their data available to us and other academic researchers. For example, Goldstein, Irvine, Kandel, and Wiener (2008) and Lipson and Puckett (2008) also use the Abel/Noser data. Other papers cited above use similar proprietary institutional trading data provided by the Plexus group.

Since we continuously track post-IPO trading for one full year, in order to be included in our sample, an institution has to have trading data for at least 13 consecutive months. For example, in order for an institution to be included for January 1999 IPOs, the institution needs to have some trading data (in any stock, not just IPOs) in every month from January 1999 to January 2000.[9] Also sample institutions must have traded in at least one sample IPO within the first year post-IPO. 419 sample institutions satisfy the above criteria. The total annualized dollar principal traded is $4.4 trillion, the total annualized shares traded is 147.7 billion, and the total annualized commissions paid is $5.4 billion. For an average IPO, our sample institutions collectively account for 11.2 percent of total trading volume reported in CRSP within the first year post-IPO.

3.2. Identifying Institutions and Their IPO Allocations

In order to infer institutional IPO allocations, we identify a subset of our sample institutions by matching with the Spectrum quarterly institutional holdings data. We first compute the change in the number of shares in each stock for each institution in the Spectrum quarterly institutional holdings data. We also compute the cumulative trading (buying minus selling) of each stock for each institution in our anonymous institutional trading data. We then identify our sample institutions by matching the two datasets based on quarterly holding changes and quarterly cumulative trading. We are able to identify 48 institutions using this method.[10]

Though the number of identified institutions is relatively small, they are larger on average. For example, the average annualized dollar principal traded is $10.5 billion for all institutions and $52.6 billion for identified institutions. These identified institutions collectively account for 8.7 percent of total trading volume reported in CRSP within the first year post-IPO. In other words, these 48 identified

[9] This restriction is imposed so as to ensure data integrity. Conversations with our data provider reveal that most institutions provide their trading data to our data provider on a monthly basis. Sometimes, an institution may miss one or more months of data. Institutions may also come in or out of the trading data when they start or terminate our data provider's services.

[10] The main reason many institutions in the Abel/Noser data are not identified is that only relatively larger institutions are required to publicly report their quarterly holdings (also they are not required to report small holdings).

institutions account for 77.7 percent (8.7 percent / 11.2 percent) of trading in IPOs done by all our 419 sample institutions. Therefore, we do not lose too much information by conducting our study of IPO allocations and allocation sales using the sub-sample of these 48 identified institutions.

For these identified institutions, we are able to compute their IPO allocations by combining our institutional trading data with quarterly holdings data reported by them. This is done by using post-IPO quarterly positions reported by these institutions, and then adding the cumulative institutional trading up to the end of the quarter in these IPOs. We use the sub-sample of these identified institutions to study the long-run pattern and realized profitability of institutional IPO allocation sales, and use all our sample institutions to study the profitability of post-IPO institutional trading and the predictability of institutional trading in IPOs.

3.3. IPO Sample

We first identify all IPOs conducted in the U.S. markets from January 1999 to December 2003 using Securities Data Company (SDC) new issues database. This time period is chosen because the institutional trading data is from January 1999 to December 2004, and we track institutional IPO trading for one year post-IPO for our main 1-year sample. We exclude certificates, ADRs, shares of beneficial interest, units, closed-end funds, REITs, IPOs with an offer price less than $5, and IPOs not found in CRSP. 990 IPOs satisfy the above criteria. We compute Book Equity for each IPO using COMPUSTAT data.[11] 11 IPOs with missing Book Equity are excluded. Further, since we continuously track institutional IPO trading for one year post-IPO, we also exclude 45 IPOs that are delisted within the first year post-IPO in CRSP.

Our initial sample consists of 934 IPOs from January 1999 to December 2003. Summary statistics of these IPOs can be found in Table 1 Panel A. The mean IPO Initial Return, measured from the offer price to the first-day closing price, is 54.9 percent. The total Money Left on the Table, defined as Offer Proceeds multiplied by Initial Return, is $51.93 billion. Table 1 Panel A partitions our initial

[11] For detailed definition of Book Equity, please see Ken French's website at http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

sample IPOs into two groups. IPOs traded by all institutions are those traded by our 419 sample institutions within the first year post-IPO, and IPOs not traded by all institutions are those not traded by any sample institution within the first year post-IPO. 909 out of 934 IPOs are traded by sample institutions. Institutions display some selectivity in IPOs. Perhaps not surprisingly, compared to IPOs traded by institutions, IPOs not traded by institutions have much lower offer prices on average ($8.01 versus $14.87), and much smaller offer sizes (1.89 million Shares Offered and $18.39 million Offer Proceeds versus 7.31 million Shares Offered and $122.11 million Offer Proceeds). Interestingly, IPOs not traded by institutions are also much "colder," with average Initial Return of 3.7 percent versus 56.3 percent, and average Money Left on the Table of -$0.29 million versus $57.13 million. These differences are statistically significant. IPOs not traded by institutions also have worse long-run performance, even though the differences are not statistically significant. Overall, IPOs not traded by institutions are relatively unimportant, accounting for only 0.4 percent of total Offer Proceeds and leaving almost no money on the table.

Table 1 Panel B further partitions the 909 IPOs traded by all institutions into hot versus cold IPOs using the median Initial Return of 24.4 percent as the cutoff. Hot IPOs have higher offer prices. As expected, most Money Left on the Table come from hot IPOs. Hot IPOs appear to have worse long-run performance (the differences in means are not statistically significant, but the differences in medians are). Throughout this paper, we separately examine hot versus cold IPOs for most of our results.

Table 1 Panel C is similar to Panel A, but partitions the initial sample of IPOs by trading of the sub-sample of identified institutions. 888 out of 934 IPOs are traded by identified institutions. In other words, only 21 IPOs are traded by all sample institutions but not identified institutions. This confirms that we do not lose much information by conducting our study of IPO allocations and allocation sales using the sub-sample of identified institutions. Table 1 Panel D further partitions the 888 IPOs traded by identified institutions into hot versus cold IPOs, using the median Initial Return of 25.0 percent as the cutoff. 441 IPOs are classified as hot, while 447 IPOs are classified as cold. The numbers of IPOs in the two groups are uneven because several IPOs have the same Initial Return as the median value of 25.0

percent. The pattern in Table 1 Panels C and D (partitioned by trading of identified institutions) is similar to Panels A and B (partitioned by trading of all institutions).

3.4. Identifying Institutional IPO Allocation Sales

In order to study the long-run pattern and realized profitability of institutional IPO allocation sales, we need an algorithm to separate institutional allocation sales from their buying and selling of IPO shares in the secondary market post-IPO. Simply put, the basic idea behind our algorithm is that, at any point of time post-IPO, when shares sold exceed shares bought till that time, these shares sold are classified as allocation sales. Figure 1 presents two simple numerical examples of our algorithm. Our algorithm is conservative in nature in that shares bought in the secondary market are used to offset shares sold first, so that only shares sold in excess of shares bought till that point in time are considered IPO allocation sales. This is consistent with the rules used by the Depository Trust Company's (DTC) IPO Tracking System. See the Appendix for details of the algorithm. By identifying IPO allocation sales, we effectively separate institutional IPO trading into two categories: IPO allocation sales and post-IPO trading. We then proceed to analyze them separately.

4. The Pattern of Institutional IPO Allocation Sales

In this section, we study the pattern of institutional IPO allocation sales and the determinants of the speed of institutional IPO allocation sales. As mentioned earlier, we use the sub-sample of identified institutions to analyze these questions.

4.1. The Pattern of Institutional IPO Allocation Sales

Table 2 reports results on the pattern of IPO allocation sales by identified sample institutions. Fraction of Offer is IPO allocations received by identified sample institutions divided by total IPO Offer Proceeds. Note that our sample institutions are a subset of the universe of institutional investors. Our identified sample institutions receive 12.7 percent of allocations per IPO on average, higher than their trading in IPOs (8.7 percent as mentioned earlier). They also receive higher allocations in hot IPOs (15.3 percent for hot IPOs versus 10.6 percent for cold IPOs). This is consistent with Aggarwal, Prabhala, and

Puri (2002), and Hanley and Wilhelm (1995), who show that institutions receive higher IPO allocations than do retail investors, especially in hotter IPOs.

Table 2 reports the time series pattern of institutional IPO allocation sales. The first year post-IPO is divided into 13 trading periods. First 2-Day is the first two trading days post-IPO. Month 1 through Month 12 each consists of 21 trading days (Month 1 includes First 2-Day). For each trading period, Table 2 presents the percentage of IPO allocations sold during that period. Aggarwal (2003) analyzes the First 2-Day flipping and find that institutions flip about 25.8 percent of shares allocated to them. She concludes that original investors hold onto their shares for the most part, conjecturing that this may be due to the fact that underwriters actively monitor and discourage short-term flipping. We are able to shed additional light on this issue, since we study the pattern of IPO allocation sales in the longer run after the IPO. A related question is whether (and to what extent) institutions are able to realize the Money Left on the Table, since it is also well known that IPOs tend to underperform in the long run (e.g., Ritter (1991) and Ritter and Welch (2002)). We answer this question in Section 5.

We find that our sample institutions flip 21.8 percent of IPO allocations within the first two days post-IPO. Our results further suggest that institutions continue to sell significant portions of their IPO allocations after the immediate two days post-IPO: 48.4 percent for the rest of the first year (70.2 percent – 21.8 percent). Thus, at the end of the first year, institutions hold only 29.8 percent of their IPO allocations.

An interesting question is whether underwriters' mechanism for monitoring flipping activities is a binding constraint on institutions. If so, IPO allocation sales should be abnormally high in Month 2, because the practice is to track IPO flipping for 30 calendar days. However, we do not observe a spike in IPO allocation sales in Month 2. Allocation sales in Month 2 are much lower than in Month 1 and are similar to subsequent months. These findings, combined with the fact that the First 2-Day is the most intensive period for allocation sales, suggest that underwriters' flipping monitoring mechanism is not very binding for institutional investors. Looking at hot versus cold IPOs separately, hot IPO allocations are sold much faster (26.8 percent versus 16.0 percent for First 2-Day and 38.9 percent versus 26.9 percent

for Month 1; these differences are statistically significant). These results suggest that underwriters discourage flipping more actively in cold IPOs.

To characterize the overall speed of institutional IPO allocation sales, we compute the Average Holding Period, which is the value-weighted average number of trading days (divided by 21 to arrive at months) sample institutions hold their IPO allocations. For residual allocations held at the end of the first year, we impute an additional holding period of one year by institutions, since the average holding period by institutions for common stocks is about one year (Investment Company Institute (2004)). We find that institutions hold their IPO allocations for 9.65 months on average. They hold cold IPOs longer: the Average Holding Period is 10.87 months for cold IPOs versus 8.62 months for hot IPOs.

4.2. Determinants of Speed of Institutional IPO Allocation Sales

In this subsection, we study the determinants of the speed of institutional IPO allocation sales. We run different specifications of the following regression:

$$\begin{aligned} &Average\ Holding\ Period = \alpha + \beta_1 Log(Age+1) + \beta_2 Log(Reputation) \\ &+ \beta_3 Initial\ Return + \beta_4 Log(Proceeds) + \beta_5 Log(Instituiton\ Size) + \beta_6 Bubble \\ &+ \beta_7 NASDAQ + \beta_8 High\text{-}Tech + \beta_9 Financial + \beta_{10} Venture\ Capital + \beta_{11} Lockup \\ &+ \beta_{12} Log(ME) + \beta_{13} Log(BE/ME) + \beta_{14} 1\text{-}Year\ Abnormal\ Return + \varepsilon . \end{aligned} \quad (1)$$

Table 3 reports results on the regression analysis of the speed of IPO allocation sales by identified sample institutions. The dependent variable is the Average Holding Period of institutional IPO allocations in months. Definitions of independent variables are as follows. Log(Age+1) is the natural logarithm of the IPO firm age plus one, where age is IPO year minus company founding year. Company founding year data are obtained from the Field-Ritter dataset of company founding dates (Field and Karpoff (2002) and Loughran and Ritter (2004)). Log(Reputation) is the natural logarithm of the lead underwriter reputation ranking. The 1992-2000 rankings are used for 1999-2000 IPOs, and the 2001-2004 rankings are used for 2001-2003 IPOs. The maximum ranking is used when there are multiple lead underwriters. The rankings are obtained from Jay Ritter's website (Loughran and Ritter (2004)), which are loosely based on Carter and Manaster (1990) and Carter, Dark, and Singh (1998) rankings. Initial Return is the IPO return from the offer price to first-day closing price. Log(Proceeds) is the natural

logarithm of the IPO Offer Proceeds. Log(Institution Size) is the natural logarithm of the annualized dollar principal traded of the institution. Bubble equals one for 1999 and 2000 IPOs, and zero otherwise. NASDAQ equals one if it is a NASDAQ IPO, and zero otherwise. High-Tech equals one if the IPO firm is in high-tech industries (defined by SIC codes, see Ljungqvist and Wilhelm (2003) and Loughran and Ritter (2004) for details), and zero otherwise. Financial equals one if the IPO firm is in the financial industry (SIC codes 60-63 and 67), and zero otherwise. Venture Capital equals one if the IPO has venture capital backing, and zero otherwise. Lockup equals one if the IPO has a lockup provision, and zero otherwise. Log(ME) is the natural logarithm of the IPO firm's Market Equity, which equals shares outstanding multiplied by the first-day closing price. Log(BE/ME) is the natural logarithm of the ratio of the IPO firm's Book Equity and Market Equity. 1-Year Abnormal Return is net of the matched Fama/French 25 Size and Book-to-Market portfolio buy-and-hold value-weighted return.

In models 1 and 2, the regression coefficients on Log(Age+1) are positive and significant, suggesting that institutions sell allocations in younger IPOs faster. Consistent with earlier univariate results, there is some evidence in models 1 and 2 that institutions sell hotter (more underpriced) IPO allocations faster. However, once more independent variables are included in models 3 and 4, the coefficients on Log(Age+1) and Initial Return become insignificant. Perhaps not too surprisingly, we find that institutions sell allocations in bubble period IPOs and high-tech IPOs faster. Interestingly, institutions also sell allocations in IPOs with lockup provisions faster. In terms of economic magnitudes, the Average Holding Period is 1.05 months shorter for IPOs with lockup provisions, 0.84 month shorter for high-tech IPOs, and 1.50 months shorter for bubble period IPOs based on model 4. Finally, institutions appear to hold IPOs with better long-run performance longer. In other words, institutions flip out of worse long-run performers faster, suggesting that they have private information about IPOs. We address the issue of whether institutions possess private information by studying the predictive power of institutional trading on subsequent long-run IPO performance in detail in Section 7.

5. Profitability of Institutional IPO Allocation Sales

Our results in the previous section suggest that institutions continue to sell significant portions of their IPO allocations beyond the immediate post-IPO period. In this section, we continue to use the sub-sample of identified institutions to study how profitable these allocation sales are to institutions and how much of the money left on the table is realized by institutions.

Table 4 reports results on the profitability of IPO allocation sales by identified sample institutions. Amount Invested is the dollar amount of IPO allocations received by sample institutions. For each IPO, sample institutions received $15.77 million in allocations with Money Left on the Table of $9.11 million. The Money Left on the Table is $17.28 million per IPO for hot IPOs, and only $1.05 million for cold IPOs. Note that the Money Left on the Table here is based on the allocation sales by institutions in our sample, not for the whole IPO. Institutional Raw Profit here measures the realized raw profit earned by institutions from selling their IPO allocations, using real transaction prices and net of trading commissions.[12] For allocations not sold within the first year, we mark them to the market at the end of the first year. Institutional Abnormal Profit is computed by discounting Institutional Raw Profit back to the first day of IPO using the matched Fama/French 25 Size and Book-to-Market portfolio buy-and-hold value-weighted return. We discount the raw profit to make it directly comparable to the money left on the table, which is calculated on the first day of IPO. We find that Institutional Abnormal Profit is in general close to or slightly higher than Money Left on the Table, i.e., institutions fully realize the money left on the table for their IPO allocations. For each IPO, sample institutions make $10.55 million in abnormal profits from selling their allocations. Overall, institutional IPO allocation sales are highly profitable: our sample institutions collectively made about $10.31 billion ($11.61 million multiplied by 888 IPOs) in raw profits and $9.37 billion ($10.55 million multiplied by 888 IPOs) in abnormal profits.

[12] We are able to accurately measure the realized profitability of both institutional IPO allocation sales and institutional post-IPO trading. In addition to trading commissions (which directly reduce realized profits), implicit trading costs such as implementation shortfall (Perold (1988)) could also be important and further reduce investors' realized profits. Our results account for both trading commissions and implicit trading costs, since we use actual transaction prices to calculate institutional investors' realized profits.

Raw $ Realization Shortfall is given by Money Left on the Table minus Institutional Raw Profit, and Abnormal $ Realization Shortfall is Money Left on the Table minus Institutional Abnormal Profit. We use these two measures to quantify how much of the money left on the table institutions fail to realize. For all IPOs, the two $ shortfall measures are slightly negative and but not significantly different from zero, indicating both Institutional Raw Profit and Institutional Abnormal Profit are not significantly different from Money Left on the Table. Institutions are able to realize more profits than the money left on the table for cold IPOs.

Institutional Raw Return is defined as Institutional Raw Profit divided by Amount Invested, and Institutional Abnormal Return as Institutional Abnormal Profit divided by Amount Invested.[13] Similar to findings using dollar values, we find that Institutional Abnormal Return is close to or slightly higher than IPO Initial Return. Both Institutional Raw Return and Institutional Abnormal Return are very high, 73.7 percent and 67.0 percent, respectively. In other words, IPO allocation sales are highly profitable to institutions.

Raw Realization Shortfall is Raw $ Realization Shortfall divided by Amount Invested, and Abnormal Realization Shortfall is Abnormal $ Realization Shortfall divided by Amount Invested. Note that, by definition, Raw Realization Shortfall is also the difference between IPO Initial Return and Institutional Raw Return, and that Abnormal Realization Shortfall is the difference between IPO Initial Return and Institutional Abnormal Return. For all IPOs, both measures are negative and but not significantly different from zero. This means that institutions fully realize the money left on the table for their IPO allocations. One reason that institutions are able to fully realize the money left on the table is that institutions flip out of IPOs with worse long-run performance faster, as we documented in the

[13] Following Ellis, Michaely, and O'Hara (2000), we study the dollar profitability of IPOs to institutions. In Table 5, all percentage values are value-weighted using Amount Invested as weights. This is done because value-weighted percentage values better reflect the true profitability of IPOs to institutions. This way, results on dollar and percentage values are consistent, for example, IPO Initial Return is equal to Money Left on the Table divided by the Amount Invested. This is also why the Initial Return reported in Table 5 is slightly different from the equal-weighted Initial Return reported in Table 1. The Initial Return reported in Table 5 better reflects the true profitability of IPOs allocated to institutions.

previous section. Similar to dollar value results, institutions realize higher returns than IPO Initial Return for cold IPOs.

6. Profitability of Post-IPO Institutional Trading

Our results in the previous section show that institutional IPO allocations sales are very profitable, and institutions fully realize the money left on the table for their IPO allocations. In this section, we use all sample institutions to study the profitability of institutional post-IPO trading, and in particular, whether institutions outperform a buy-and-hold investment strategy in IPOs. We then analyze the determinants of institutional outperformance in post-IPO trading.

6.1. Profitability of Post-IPO Institutional Trading

Table 5 reports results on the profitability of post-IPO trading by all sample institutions. In Table 5, Amount Invested is the actual dollar amount of buy principal plus trading commissions spent by sample institutions in post-IPO trading within the first year post-IPO. Amount Invested in Current Dollars is computed by discounting Amount Invested back to the first day of IPO using the return on the matched Fama/French 25 Size and Book-to-Market portfolio. Both Amount Invested and Amounted Invested in Current Dollars are much higher for hot IPOs than for cold IPOs (both differences are statistically significant), suggesting that hot IPOs attract more post-IPO institutional investment.

Institutional Raw Profit is the raw profit earned by institutions from post-IPO trading (excluding allocation sales) within the first year post-IPO, using real buying and selling prices by institutions and net of trading commissions, and marking net positions to the market at the end of the first year post-IPO. Institutional Abnormal Profit is computed by discounting Institutional Raw Profit back to the first day of IPO using the return on the matched Fama/French 25 Size and Book-to-Market portfolio. Both Institutional Raw Profit and Institutional Abnormal Profit from post-IPO trading are much smaller compared to the profits from IPO allocation sales in Table 4, even though the Amount Invested is much higher in post-IPO trading. Note that none of the dollar profits from post-IPO trading are significantly different from zero, suggesting that institutions do not significantly gain or lose money in post-IPO trading.

Institutional Raw Return is given by Institutional Raw Profit divided by Amount Invested. None of the Institutional Raw Returns are significantly different from zero. IPO Buy-and-Hold Raw Return is the first day closing market value-weighted buy-and-hold return from the first trading day to trading day 252 for the 934 initial sample IPOs. We further define Institutional Raw Outperformance as Institutional Raw Return minus IPO Buy-and-Hold Raw Return. Our objective is to see whether institutions can outperform a naive buy-and-hold investment strategy in IPOs by analyzing the difference between the above two returns. Overall, institutional post-IPO trading performs significantly better than a buy-and-hold strategy in IPOs (14.5 percent). The outperformance seems to mostly come from hot IPOs. Note that hot IPOs also have significantly negative buy-and-hold returns. Therefore, one explanation for our findings could be that institutions outperform a buy-and-hold strategy in post-IPO trading mainly by avoiding IPOs that underperform significantly in the long run.

Institutional Abnormal Return is Institutional Abnormal Profit divided by Amount Invested in Current Dollars. IPO Buy-and-Hold Abnormal Return is computed by discounting IPO Buy-and-Hold Raw Return back to the first day of IPO using the return on the matched Fama/French 25 Size and Book-to-Market portfolio. Further, Institutional Abnormal Outperformance is given by Institutional Abnormal Return minus IPO Buy-and-Hold Abnormal Return. None of the Institutional Abnormal Returns are significantly different from zero, suggesting that institutions do not significantly outperform or underperform the overall stock market in post-IPO trading (after controlling for Fama/French factors). However, institutions do show some ability in trading IPOs in the secondary market, since they outperform a naive buy-and-hold investment strategy in IPOs, which is money-losing. Again, institutions' ability in post-IPO trading seems to stem from their ability to avoid "bad" IPOs, i.e., they outperform in hot IPOs, where the buy-and-hold abnormal returns are negative.

6.2. Determinants of Institutional Abnormal Outperformance in Post-IPO Trading

In this subsection, we study the determinants of institutional abnormal outperformance in post-IPO trading in a regression framework. We run different specifications of the following regression:

$$\begin{aligned} &Institutional\ Abnormal\ Outperformance = \alpha + \beta_1 Log(Age+1) + \beta_2 Log(Reputation) \\ &+\beta_3 Initial\ Return + \beta_4 Log(Proceeds) + \beta_5 Log(Instituiton\ Size) + \beta_6 Bubble \\ &+\beta_7 NASDAQ + \beta_8 High\text{-}Tech + \beta_9 Financial + \beta_{10} Venture\ Capital + \beta_{11} Lockup \\ &+\beta_{12} Log(ME) + \beta_{13} Log(BE/ME) + \beta_{14} Young/Large + \beta_{15} Low\ Reputation/Large + \varepsilon\ . \end{aligned} \quad (2)$$

Table 6 reports the results of our regression analysis of abnormal outperformance in post-IPO trading by all sample institutions. See Section 6.1 for details of Institutional Abnormal Outperformance in post-IPO trading. Definitions of most of the independent variables can be found in Section 4.2. There are two additional interactive terms. Young/Large is a dummy variable that equals one if the IPO firm is young (younger than the sample mean age of 14 years) and the trading is done by a large institution (more than $10 billion in annualized dollar principal traded), and zero otherwise. Low Reputation/Large is a dummy variable that equals one if the IPO is underwritten by a low reputation lead underwriter (reputation rank lower than 9.1) and the trading is done by a large institution, and zero otherwise.

Our results in Table 6 show that institutions are able to outperform more when there is higher information asymmetry about the IPO firm, namely in younger IPOs and IPOs underwritten by less reputable investment banks (coefficients on both Log(Age+1) and Log(Reputation) are negative and significant). As for economic magnitudes, a one standard deviation increase in Log(Age+1) (Log(Reputation)) leads to an increase of 9.3 percent (4.8 percent) in abnormal outperformance based on model 3 (8.2 percent for Log(Age+1) and 4.6 percent for Log(Reputation) in model 4). Larger institutions appear to outperform more than smaller institutions (coefficients on Log(Institution Size) are positive and significant). These results suggest that larger institutions have a comparative advantage in producing information about IPO firms relative to smaller institutions, perhaps due to economies of scale in information production. This interpretation is strengthened by the finding that the coefficients on the two interactive terms, Young/Large and Low Reputation/Large, are both positive and significant. This means that large institutions have especially higher abnormal outperformance in post-IPO trading when they trade in informationally opaque issuers. In terms of economic significance, a one standard deviation increase in Log(Institution Size) leads to an increase of 4.6 percent in abnormal outperformance based on model 3. In model 4, which includes the two interactive terms, a one standard deviation increase in

Log(Institution Size) leads to an increase of 1.6 percent in abnormal outperformance. In addition, the coefficients on the two interactive terms suggest that when large institutions trade in young IPO firms (IPOs underwritten by low reputation investment banks), they achieve an additional 10.8 percent (1.8 percent) abnormal outperformance.

Consistent with earlier univariate results, institutions tend to outperform more in hotter IPO (coefficients on Initial Return are all positive and significant in models 3 and 4). There is some evidence that institutions outperform more in NASDAQ IPOs. Coefficients on Bubble and High-Tech dummies are not significant. Institutions also appear to outperform more in IPOs with lockup provisions. Being sophisticated investors, institutional investors may be able to avoid the pitfalls of lockup expiration (see, e.g., Brav and Gompers (2003), who show that stock prices for IPOs decline at the time of lockup expiration).

7. Institutional Trading and Subsequent Long-Run IPO Performance

In the previous two sections, we studied the realized profitability of institutional IPO allocation sales and post-IPO trading. We now use all sample institutions to study whether institutional trading can predict subsequent long-run IPO performance. We extend Krigman, Shaw, and Womack (1999) by using transaction-level intuitional trading data that include the direction of each trade and studying institutional net buying (buying minus selling) in IPOs. We also analyze the information content of institutional trading beyond the immediate post-IPO period.

7.1. Can Institutional Trading Predict Subsequent Long-Run IPO Performance?

Figure 2 plots the relation between trading in IPOs by all sample institutions over time and subsequent long-run IPO performance. As before, the first year post-IPO is divided into 13 trading periods. Net Buying for each trading period is the total shares bought by institutions minus the total shares sold by institutions normalized by Shares Offered in the IPO. We then sort our sample IPOs into quintiles based on Net Buying. The lowest, middle three, and highest quintiles of institutional Net Buying are categorized as Low, Moderate, and High IPOs, respectively. Subsequent Raw Return is the IPO one-year buy-and-hold raw return starting after each of the 13 trading periods. Subsequent Abnormal

Return is the difference between Subsequent Raw Return and the return on the matched Fama/French 25 Size and Book-to-Market portfolio.

The High - Low differences in Subsequent Raw and Abnormal Returns are plotted in Figure 2. If institutional trading is informative, then the return differences should be positive, i.e., the IPOs bought by institutions should experience higher subsequent returns than IPOs sold by institutions. There is a clear downward sloping trend over time. For First 2-Day, Month 1, and Month 2, High - Low Subsequent Raw and Abnormal Returns are all highly positive (in results not reported here, these return differences are all statistically significant at the 1 or 5 percent level). For Month 3, the return differences are still positive but smaller (they are only marginally statistically significant). After Month 3, the return differences become smaller and sometimes are even negative (none of these later return differences are statistically significant). These results suggest that while institutions do possess private information immediately after an IPO, their informational advantage decays over time. This could be due to institutions trying to exploit their private information early on.

7.2. Can Institutional Trading Predict Subsequent Long-Run IPO Performance After Controlling for Publicly Available Information?

In this subsection, we study the relation between institutional trading and subsequent long-run IPO performance in a regression framework. The question here is whether institutional trading can predict long-run IPO performance after controlling for publicly available information (and factors known to affect expected stock returns: size and book-to-market). We run the following regression for each of the 13 trading periods:

$$\begin{aligned} &Subsequent\ Abnormal\ Return = \alpha + \beta_1 Net\ Buying + \beta_2 Log(Age+1) + \beta_3 Log(Reputation) \\ &+ \beta_4 Initial\ Return + \beta_5 Log(Proceeds) + \beta_6 Bubble + \beta_7 NASDAQ + \beta_8 High\text{-}Tech \\ &+ \beta_9 Financial + \beta_{10} Venture\ Capital + \beta_{11} Lockup + \beta_{12} Log(ME) + \beta_{13} Log(BE/ME) + \varepsilon . \end{aligned} \quad (3)$$

Table 7 reports the results of our regression analysis institutional trading over time and subsequent long-run IPO performance. The dependent variable is Subsequent Abnormal Return, which is the IPO one-year buy-and-hold return (starting one day after each of the 13 trading periods) net of the

return on the matched Fama/French 25 Size and Book-to-Market portfolio. Net buying is as defined in Section 7.1. Definitions of other independent variables can be found in Section 4.2.

Results in Table 7 Panel A show that our univariate results plotted in Figure 2 are robust after controlling for various variables reflecting publicly available information. In particular, institutional trading (Net Buying) can predict long-run IPO performance even after controlling for publicly available information. In other words, the informational advantage possessed by institutions appears to be derived from private information. In terms of economic significance, for example, a one standard deviation increase in Net Buying during the first two days leads to an increase of 7.8 percent in Subsequent Abnormal Return (8.4 percent for Net Buying during the first month). The overall pattern of the informativeness of institutional Net Buying after controlling for publicly available information is very similar to the univariate results plotted in Figure 2, i.e., the predictive power of institutional Net Buying decays over time, and becomes insignificant after the initial four months post-IPO. After a company goes public, it has to make a significant amount of information publicly available (e.g., audited financial statements), which reduces outsiders' cost of information production. Therefore, our results suggest that institutions have a greater informational advantage when the cost of producing information is higher (during the immediate post-IPO period). Institutions may gradually lose this informational advantage as more and more information about the IPO firm becomes publicly available. As for the control variables, older IPOs (and, to some extent, IPOs underwritten by more reputable investment banks) tend to have better long-run performance. Hotter IPOs, IPOs issued during the bubble period, NASDAQ IPOs, and IPOs with lockup provisions tend to have worse long-run performance.

All institutions are further partitioned into large versus small institutions (using $10 billion annualized dollar principal traded as the cutoff), and the regression results are reported separately for them in Table 7 Panels B and C. The results show that while the predictive power of Net Buying by large institutions is robust after controlling for publicly available information, the predictive power of trading by small institutions mostly disappears. It appears that while large institutions produce and make use of private information that is orthogonal to publicly available information, small institutions mainly make

use of publicly available information. One reason could be that large institutions may be able to afford many in-house analysts, while small institutions may not be able to do so.

8. Discussion of Results and Conclusion

In this paper, we analyzed the profitability and informativeness of institutional trading in IPOs using a large sample of proprietary transaction-level institutional trading data. We analyzed the pattern and profitability of institutional IPO allocation sales, the profitability of post-IPO institutional trading, and the predictive power of institutional trading for subsequent long-run IPO performance.

Our results can be summarized as follows. First, institutions continue to sell significant portions of their IPO allocations beyond the immediate post-IPO period. Second, institutional IPO allocation sales are highly profitable: institutions fully realize the money left on the table for their IPO allocations. Third, post-IPO institutional trading outperforms a buy-and-hold investment strategy in IPOs, suggesting that institutions do possess some private information about IPOs (though institutions' post-IPO trading does not outperform or underperform the market in general). Institutions are able to outperform more when there is higher information asymmetry about the IPO firm, namely younger IPOs and IPOs underwritten by less reputable investment banks. Larger institutions outperform a buy-and-hold strategy in IPOs by a higher margin than smaller institutions, suggesting that larger institutions have a comparative advantage in producing information about IPO firms relative to smaller institutions.

Finally, institutional trading has predictive power for subsequent long-run IPO performance. This is still true after controlling for publicly available information. Even institutional trading beyond the immediate post-IPO period has predictive power, indicating that institutions appear to retain residual private information for some time after the IPO. However, the predictive power decays over time and becomes insignificant after the initial three to four months. Our results suggest that institutions have a greater informational advantage when outsiders' cost of producing information is higher (during the immediate post-IPO period). Institutions gradually lose their informational advantage over retail investors as more and more information about the IPO firm becomes publicly available. We also find that

trading by large institutions has more predictive power, after controlling for publicly available information.

How do our results relate to various theories of IPO pricing and the behavior of different categories of investors around IPOs? First, our results indicate that, consistent with information production theories, institutional investors are able to generate superior information about IPOs. Further, we document that, as assumed by Rock (1986), institutional investors appear to possess an informational advantage over retail investors, enabling them to select better performing IPOs. Second, we show that institutional investors are able to realize significant abnormal profits from IPO allocations. In particular, they are able to fully realize the money left on the table for their IPO allocations. Overall, institutional investors receive considerable compensation for participating in IPOs, broadly consistent with the implications of bookbuilding theories (e.g., Benveniste and Spindt (1989)). Third, the fact that institutional trading in the months after the IPO has predictive power for subsequent long-run IPO returns suggests that institutional investors retain a residual informational advantage over retail investors even after the IPO. Thus, while underpricing indeed seems to be a way of compensating institutions for revealing their private information as predicted by bookbuilding theories, our results indicate that institutions do not reveal their entire private information at the time of the IPO. Consistent with this, the post-IPO trading of institutions is able to outperform a naive buy-and-hold strategy in IPOs, so that the superior profits institutions generate from their IPO allocation sales are not dissipated in post-IPO trading (allowing institutions to extract informational rents overall from investing in IPOs). Finally, our results show that larger institutions have a greater informational advantage relative to that of smaller institutions, indicating the existence of significant economies of scale in information production. Based on the implications of bookbuilding theories, this suggests that underwriters may be justified in allocating a greater proportion of IPO shares to larger institutions.

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Appendix: Details of Algorithm for Identifying Institutional IPO Allocation Sales

For each IPO/institution pair, we implement the following algorithm recursively everyday starting from the first IPO trading day ($t = 1$) to trading day 252 ($t = 252$). Note that the algorithm below needs to be implemented recursively every trading day, since whether a given sale of IPO shares by an institution is classified as IPO allocation sales depends on the number of shares bought and sold in the secondary market till that point in time by that institution. For example, if an institution sells 100 shares of an IPO on the first day and then buys 500 shares of the same IPO on the second day, the 100 shares sold on the first day is clearly allocation sales, since the institution could have obtained the 100 shares it sold only from IPO allocations. However, if we reverse the order of these two trades (buys 500 shares on the first day and then sells 100 shares on the second day), the 100 shares sold cannot be classified as allocation sales, since, conservatively, these 100 shares can be viewed as part of the 500 shares bought by the institution in the secondary market (in this case, both trades are classified as post-IPO trading). The two numerical examples in Figure 1 also illustrate this point. In both examples, from day 1 to day 3, there are 1,000 shares bought and 1,200 shares sold. However, by switching day 1 and day 2's transactions, there are 500 shares allocation sales in example 1, but only 200 shares allocation sales in example 2.

For each IPO/institution pair, we calculate the number of shares bought on day t, $N_B(t) = \sum_{j=1}^{B_t} N_B(j)$ where B_t is the number of buy trades in the IPO for the institution on day t, and $N_B(j)$ is the number of shares bought in the j th trade, at price $P(j)$, and with trading commissions paid $COM(j)$. Similarly, the number of shares sold on day t is $N_S(t) = \sum_{j=1}^{S_t} N_S(j)$. The change in the institution's IPO position on day t is given by the number of shares bought minus shares sold, as follows:

$$\Delta POS(t) = N_B(t) - N_S(t). \tag{A1}$$

We can calculate the cumulative IPO position from "pure" post-IPO trading (buying and selling in the secondary market, excluding IPO allocation sales) as follows:

$$POS_{POSTIPO}(t) = POS_{POSTIPO}(t-1) + \Delta POS_{POSTIPO}(t), \tag{A2}$$

where

$$POS_{POSTIPO}(0) = 0,$$

and

$$\Delta POS_{POSTIPO}(t) = \max\left(\Delta POS(t), -POS_{POSTIPO}(t-1)\right).$$

The IPO allocation shares sold on day t is then given by:

$$N_S^{ALLO}(t) = -\min\left(0,\, POS_{POSTIPO}(t-1) + \Delta POS(t)\right). \tag{A3}$$

And finally, shares bought and sold in "pure" post-IPO trading excluding IPO allocation sales are given by:

$$\begin{aligned} N_B^{POSTIPO}(t) &= N_B(t) \\ N_S^{POSTIPO}(t) &= N_S(t) - N_S^{ALLO}(t). \end{aligned} \tag{A4}$$

Table 1. Summary Statistics of IPO Sample

This table presents summary statistics of the IPO sample. Sample mean, median, and in some cases total are presented. Initial sample IPOs are those conducted in the U.S. markets from January 1999 through December 2003, identified using the Securities Data Company (SDC) data. Certificates, ADRs, shares of beneficial interest, units, closed-end funds, REITs, IPOs with an offer price less than $5, and IPOs not found in CRSP are excluded. Further, we exclude IPOs with missing Book Equity data in COMPUSTAT and IPOs that are delisted within the first year. Shares Offered and Offer Proceeds are those offered in the U.S. markets. Initial Return is the IPO return from the offer price to first-day closing price. Money Left on the Table is defined as Offer Proceeds multiplied by Initial Return. 1-Year Raw Return is the raw buy-and-hold return measured from the closing price of the first trading day to trading day 252. 1-Year Abnormal Return is the difference between 1-Year Raw Return and the matched Fama/French 25 Size and Book-to-Market portfolio buy-and-hold value-weighted return. Panels A and C partition initial sample IPOs into two groups. IPOs Traded by All (Identified) Institutions are those traded by all (identified) sample institutions within the first year, while IPOs Not Traded by All (Identified) Institutions are those not traded by any sample (identified) institution within the first year. Panel B (Panel D) further partitions IPOs Traded by All (Identified) Institutions into hot versus cold IPOs using the median Initial Return as the cutoff (24.4 percent for Panel B and 25.0 percent for Panel D). The last column tests the significance of the differences in the means and medians between the two groups. P-values, which are in parentheses, are based on t-tests for the difference in means and the Mann-Whitney tests for the difference in medians. Statistical significance is indicated by *** for one percent level, ** for five percent level, and * for ten percent level.

Table 1. Panel A. Initial Sample IPOs, Partitioned by Trading of All Institutions

	Initial Sample IPOs	IPOs Traded by All Institutions	IPOs Not Traded by All Institutions	Test Equality
Number of IPOs	934	909	25	
Offer Price ($)				
Mean	14.69	14.87	8.01	(<0.001)***
Median	14.00	14.00	7.00	(<0.001)***
Shares Offered (million)				
Mean	7.16	7.31	1.89	(<0.001)***
Median	4.61	4.70	1.30	(<0.001)***
Total	6,690.30	6,643.13	47.18	
Offer Proceeds ($ million)				
Mean	119.34	122.11	18.39	(<0.001)***
Median	65.42	67.20	8.61	(<0.001)***
Total	111,461.80	111,002.10	459.70	
Initial Return (%)				
Mean	54.85	56.25	3.73	(<0.001)***
Median	23.29	24.43	1.04	(<0.001)***
Money Left on the Table ($ million)				
Mean	55.59	57.13	-0.29	(<0.001)***
Median	16.50	18.65	0.09	(<0.001)***
Total	51,925.71	51,932.91	-7.20	
1-Year Raw Return (%)				
Mean	-8.69	-8.27	-23.70	(0.532)
Median	-41.36	-41.18	-63.16	(0.379)
1-Year Abnormal Return (%)				
Mean	-15.08	-14.65	-30.82	(0.472)
Median	-41.24	-40.68	-49.11	(0.235)

Table 1. Panel B. IPOs Traded by All Institutions, Partitioned by IPO Initial Return

	Hot IPOs	Cold IPOs	Test Equality
Number of IPOs	455	454	
Offer Price ($)			
Mean	16.51	13.24	(<0.001)***
Median	16.00	13.00	(<0.001)***
Shares Offered (million)			
Mean	5.73	8.89	(<0.001)***
Median	4.48	5.00	(0.002)***
Total	2,608.13	4,035.00	
Offer Proceeds ($ million)			
Mean	109.70	134.55	(0.167)
Median	71.17	60.48	(0.019)**
Total	49,914.96	61,087.14	
Initial Return (%)			
Mean	108.28	4.11	(<0.001)***
Median	75.00	2.34	(<0.001)***
Money Left on the Table ($ million)			
Mean	106.74	7.42	(<0.001)***
Median	57.32	1.25	(<0.001)***
Total	48,566.46	3,366.45	
1-Year Raw Return (%)			
Mean	-14.19	-2.34	(0.148)
Median	-57.66	-26.40	(<0.001)***
1-Year Abnormal Return (%)			
Mean	-18.99	-10.30	(0.258)
Median	-48.06	-28.71	(<0.001)***

Table 1. Panel C. Initial Sample IPOs, Partitioned by Trading of Identified Institutions

	Initial Sample IPOs	IPOs Traded by Identified Institutions	IPOs Not Traded by Identified Institutions	Test Equality
Number of IPOs	934	888	46	
Offer Price ($)				
Mean	14.69	15.01	8.40	(<0.001)***
Median	14.00	14.00	8.00	(<0.001)***
Shares Offered (million)				
Mean	7.16	7.41	2.36	(<0.001)***
Median	4.61	4.79	1.88	(<0.001)***
Total	6,690.30	6,581.77	108.53	
Offer Proceeds ($ million)				
Mean	119.34	124.38	22.02	(<0.001)***
Median	65.42	68.06	13.75	(<0.001)***
Total	111,461.80	110,448.82	1,012.98	
Initial Return (%)				
Mean	54.85	57.40	5.65	(<0.001)***
Median	23.29	25.00	0.33	(<0.001)***
Money Left on the Table ($ million)				
Mean	55.59	58.48	-0.05	(<0.001)***
Median	16.50	19.81	0.04	(<0.001)***
Total	51,925.71	51,928.01	-2.30	
1-Year Raw Return (%)				
Mean	-8.69	-7.78	-26.19	(0.259)
Median	-41.36	-40.69	-62.97	(0.166)
1-Year Abnormal Return (%)				
Mean	-15.08	-13.84	-39.03	(0.086)*
Median	-41.24	-40.33	-51.87	(0.015)**

Table 1. Panel D. IPOs Traded by Identified Institutions, Partitioned by IPO Initial Return

	Hot IPOs	Cold IPOs	Test Equality
Number of IPOs	441	447	
Offer Price ($)			
Mean	16.68	13.37	(<0.001)***
Median	16.00	13.00	(<0.001)***
Shares Offered (million)			
Mean	5.78	9.02	(<0.001)***
Median	4.49	5.00	(<0.001)***
Total	2,549.66	4,032.11	
Offer Proceeds ($ million)			
Mean	111.70	136.89	(0.170)
Median	72.00	61.60	(0.038)**
Total	49,260.64	61,188.18	
Initial Return (%)			
Mean	110.65	4.86	(<0.001)***
Median	76.67	3.13	(<0.001)***
Money Left on the Table ($ million)			
Mean	109.71	7.94	(<0.001)***
Median	61.19	1.69	(<0.001)***
Total	48,380.64	3,547.37	
1-Year Raw Return (%)			
Mean	-14.09	-1.55	(0.134)
Median	-58.20	-24.94	(<0.001)***
1-Year Abnormal Return (%)			
Mean	-18.81	-8.94	(0.208)
Median	-48.30	-26.98	(<0.001)***

Table 2. Pattern of Institutional IPO Allocation Sales

This table presents results on the pattern of IPO allocation sales by identified sample institutions. Fraction of Offer is IPO allocations received by identified sample institutions divided by total IPO Offer Proceeds. The first year (252 trading days) post-IPO is divided into 13 trading periods. First 2-Day is the first two trading days post-IPO. Month 1 through Month 12 each consists of 21 trading days (Month 1 includes First 2-Day). For each trading period, this table presents the dollar value-weighted percentage of IPO allocations sold during that period. Average Holding Period is the value-weighted average number of trading days (divided by 21 to arrive at months) sample institutions hold their IPO allocations. For residual allocations held at the end of the first year, we impute an additional holding period of one year by institutions, since the average holding period by institutions for common stocks is about one year (Investment Company Institute (2004)). The last column tests the significance of the differences in the means, with p-values in parentheses. Statistical significance is indicated by *** for one percent level, ** for five percent level, and * for ten percent level.

	All IPOs	Hot IPOs	Cold IPOs	Test Equality
Number of IPOs	888	441	447	
Fraction of Offer (%)	12.68	15.32	10.55	(0.001)***
First 2-Day (%)	21.80	26.78	15.98	(0.004)***
Month 1 (%)	33.39	38.93	26.91	(0.009)***
Month 2 (%)	3.79	4.39	3.09	(0.140)
Month 3 (%)	3.11	3.12	3.08	(0.966)
Month 4 (%)	2.84	1.94	3.88	(0.143)
Month 5 (%)	2.29	2.04	2.58	(0.433)
Month 6 (%)	3.01	2.26	3.89	(0.075)*
Month 7 (%)	4.97	5.20	4.70	(0.881)
Month 8 (%)	3.83	2.85	4.98	(0.495)
Month 9 (%)	2.61	1.82	3.54	(0.091)*
Month 10 (%)	2.40	2.88	1.84	(0.332)
Month 11 (%)	4.83	5.75	3.76	(0.570)
Month 12 (%)	3.17	3.13	3.22	(0.931)
Total Year 1 (%)	70.24	74.31	65.47	(0.200)
Average Holding Period (months)	9.65	8.62	10.87	(0.083)*

Table 3. Regression Analysis of Speed of Institutional IPO Allocation Sales

This table presents regression analysis of the speed of IPO allocation sales by identified sample institutions. The dependent variable is Average Holding Period in months as defined before. Definitions of independent variables are as follows. Log(Age+1) is the natural logarithm of the IPO firm age plus one, where age is IPO year minus company founding year. Company founding year data are obtained from the Field-Ritter dataset of company founding dates (Field and Karpoff (2002) and Loughran and Ritter (2004)). Log(Reputation) is the natural logarithm of the lead underwriter reputation ranking. The 1992-2000 rankings are used for 1999-2000 IPOs, and the 2001-2004 rankings are used for 2001-2003 IPOs. The maximum ranking is used when there are multiple lead underwriters. The rankings are obtained from Jay Ritter's website (Loughran and Ritter (2004)), which are loosely based on Carter and Manaster (1990) and Carter, Dark, and Singh (1998) rankings. Initial Return is the IPO return from the offer price to first-day closing price. Log(Proceeds) is the natural logarithm of the IPO Offer Proceeds. Log(Institution Size) is the natural logarithm of the annualized dollar principal traded of the institution. Bubble equals one for 1999 and 2000 IPOs, and zero otherwise. NASDAQ equals one if it is a NASDAQ IPO, and zero otherwise. High-Tech equals one if the IPO firm is in high-tech industries (defined by SIC codes, see Ljungqvist and Wilhelm (2003) and Loughran and Ritter (2004) for details), and zero otherwise. Financial equals one if the IPO firm is in the financial industry (SIC codes 60-63 and 67), and zero otherwise. Venture Capital equals one if the IPO has venture capital backing, and zero otherwise. Lockup equals one if the IPO has a lockup provision, and zero otherwise. Log(ME) is the natural logarithm of the IPO firm's Market Equity, which equals shares outstanding multiplied by the first-day closing price. Log(BE/ME) is the natural logarithm of the ratio of the IPO firm's Book Equity and Market Equity. 1-Year Abnormal Return is net of the matched Fama/French 25 Size and Book-to-Market portfolio buy-and-hold value-weighted return. The unit of observation is an IPO/institution pair. P-values, which are in parentheses, are adjusted using White's robust standard errors with clustering on IPOs. Statistical significance is indicated by *** for one percent level, ** for five percent level, and * for ten percent level.

	(1)	(2)	(3)	(4)
Log(Age+1)	0.682***	0.328**	0.259	0.081
	(<0.001)	(0.037)	(0.107)	(0.616)
Log(Reputation)	-0.680	-0.178	-0.965	-1.598
	(0.530)	(0.867)	(0.412)	(0.171)
Initial Return	-0.536***	-0.232*	0.132	0.291
	(<0.001)	(0.082)	(0.523)	(0.257)
Log(Proceeds)	0.294*	-0.235	0.404	0.565
	(0.072)	(0.215)	(0.262)	(0.116)
Log(Institution Size)	0.055	0.111	0.106	0.112
	(0.503)	(0.182)	(0.206)	(0.179)
Bubble		-1.479***	-1.735***	-1.500***
		(<0.001)	(<0.001)	(<0.001)
NASDAQ		-1.189**	-0.874	-0.642
		(0.024)	(0.119)	(0.250)
High-Tech		-0.904***	-0.759***	-0.838***
		(0.001)	(0.005)	(0.002)
Financial		1.201*	1.314*	1.002
		(0.069)	(0.051)	(0.129)
Venture Capital			-0.106	-0.171
			(0.738)	(0.587)
Lockup			-1.267***	-1.054***
			(<0.001)	(0.001)
Log(ME)			-0.734**	-0.689**
			(0.022)	(0.031)
Log(BE/ME)			-0.048	0.164
			(0.843)	(0.507)
1-Year Abnormal Return				1.053***
				(<0.001)
Intercept	0.189	10.335**	15.781***	13.463***
	(0.962)	(0.022)	(0.001)	(0.006)
N	4,620	4,620	4,477	4,477
Adj. R-Squared	0.013	0.024	0.024	0.046

Table 4. Profitability of Institutional IPO Allocation Sales

This table presents results on the profitability of IPO allocation sales by identified sample institutions. Amount Invested is the dollar amount of IPO allocations received by sample institutions. Money Left on the Table equals Amount Invested multiplied by IPO Initial Return, where IPO Initial Return is the IPO return from the offer price to first-day closing price. Institutional Raw Profit here measures the realized raw profit earned by institutions from selling their IPO allocations, using real transaction prices and net of trading commissions. For allocations not sold within the first year, we mark them to the market at the end of the first year. Institutional Abnormal Profit is computed by discounting Institutional Raw Profit back to the first day of IPO using the matched Fama/French 25 Size and Book-to-Market portfolio buy-and-hold value-weighted return. Raw $ Realization Shortfall equals Money Left on the Table minus Institutional Raw Profit. Abnormal $ Realization Shortfall equals Money Left on the Table minus Institutional Abnormal Profit. Institutional Raw Return equals Institutional Raw Profit divided by Amount Invested. Institutional Abnormal Return equals Institutional Abnormal Profit divided by Amount Invested. Raw Realization Shortfall equals Raw $ Realization Shortfall divided by Amount Invested. Abnormal Realization Shortfall equals Abnormal $ Realization Shortfall divided by Amount Invested. Sample means of dollar values and dollar value-weighted means of percentages are reported. The last column tests the significance of the differences in the means, with p-values in parentheses. Statistical significance is indicated by *** for one percent level, ** for five percent level, and * for ten percent level.

	All IPOs	Hot IPOs	Cold IPOs	Test Equality
Number of IPOs	888	441	447	
Amount Invested ($ millions)	15.77	17.11	14.44	(0.447)
Money Left on the Table ($ millions)	9.11***	17.28***	1.05***	(<0.001)***
	(<0.001)	(<0.001)	(<0.001)	
Institutional Raw Profit ($ millions)	11.61***	19.27***	4.06***	(<0.001)***
	(<0.001)	(<0.001)	(0.007)	
Institutional Abnormal Profit ($ millions)	10.55***	17.51***	3.70***	(<0.001)***
	(<0.001)	(<0.001)	(0.009)	
Raw $ Realization Shortfall ($ millions)	-2.50	-1.99	-3.01**	(0.757)
	(0.127)	(0.503)	(0.036)	
Abnormal $ Realization Shortfall ($ millions)	-1.44	-0.23	-2.64**	(0.463)
	(0.378)	(0.940)	(0.049)	
IPO Initial Return (%)	57.79***	100.98***	7.30***	(<0.001)***
	(<0.001)	(<0.001)	(<0.001)	
Institutional Raw Return (%)	73.65***	112.59***	28.11***	(<0.001)***
	(<0.001)	(<0.001)	(<0.001)	
Institutional Abnormal Return (%)	66.95***	102.31***	25.60***	(<0.001)***
	(<0.001)	(<0.001)	(<0.001)	
Raw Realization Shortfall (%)	-15.85	-11.61	-20.81***	(0.619)
	(0.104)	(0.489)	(0.008)	
Abnormal Realization Shortfall (%)	-9.15	-1.33	-18.30**	(0.370)
	(0.356)	(0.939)	(0.013)	

Table 5. Profitability of Post-IPO Institutional Trading

This table presents results on the profitability of post-IPO trading by all sample institutions. Amount Invested is the actual dollar amount of buy principal plus trading commissions spent by sample institutions in post-IPO trading within the first year post-IPO. Amount Invested in Current Dollars is computed by discounting Amount Invested back to the first day of IPO using the return on the matched Fama/French 25 Size and Book-to-Market portfolio. Institutional Raw Profit is the raw profit earned by institutions from post-IPO trading (excluding allocation sales) within the first year post-IPO, using real buying and selling prices by institutions and net of trading commissions, and marking net positions to the market at the end of the first year post-IPO. Institutional Abnormal Profit is computed by discounting Institutional Raw Profit back to the first day of IPO using the matched Fama/French 25 Size and Book-to-Market portfolio buy-and-hold value-weighted return. Institutional Raw Return equals Institutional Raw Profit divided by Amount Invested. IPO Buy-and-Hold Raw Return is the first day closing market value-weighted buy-and-hold return in the first year for initial sample IPOs. Institutional Raw Outperformance equals Institutional Raw Return minus IPO Buy-and-Hold Raw Return. Institutional Abnormal Return equals Institutional Abnormal Profit divided by Amount Invested in Current Dollars. IPO Buy-and-Hold Abnormal Return is computed by discounting IPO Buy-and-Hold Raw Return back to the first day of IPO using the matched Fama/French 25 Size and Book-to-Market portfolio buy-and-hold value-weighted return. Institutional Abnormal Outperformance equals Institutional Abnormal Return minus IPO Buy-and-Hold Abnormal Return. Sample means of dollar values and dollar value-weighted means of percentages are reported. The last column tests the significance of the differences in the means, with p-values in parentheses. Statistical significance is indicated by *** for one percent level, ** for five percent level, and * for ten percent level.

	All IPOs	Hot IPOs	Cold IPOs	Test Equality
Number of IPOs	909	455	454	
Amount Invested ($ millions)	137.08	198.70	75.32	(<0.001)***
Amount Invested in Current Dollars ($ millions)	124.33	175.69	72.86	(<0.001)***
Institutional Raw Profit ($ millions)	-0.43	-0.25	-0.61	(0.974)
	(0.937)	(0.981)	(0.755)	
Institutional Abnormal Profit ($ millions)	-1.93	-3.83	-0.03	(0.671)
	(0.667)	(0.665)	(0.986)	
Institutional Raw Return (%)	-0.31	-0.13	-0.80	(0.910)
	(0.938)	(0.981)	(0.756)	
IPO Buy-and-Hold Raw Return (%)	-14.79**	-21.32**	1.75	(0.054)*
	(0.038)	(0.024)	(0.812)	
Institutional Raw Outperformance (%)	14.48*	21.20*	-2.55	
	(0.076)	(0.051)	(0.744)	
Institutional Abnormal Return (%)	-1.55	-2.18	-0.03	(0.699)
	(0.673)	(0.674)	(0.986)	
IPO Buy-and-Hold Abnormal Return (%)	-22.59***	-31.73***	0.56	(0.002)***
	(<0.001)	(<0.001)	(0.931)	
Institutional Abnormal Outperformance (%)	21.03***	29.54***	-0.60	
	(0.003)	(0.002)	(0.930)	

Table 6. Regression Analysis of Institutional Abnormal Outperformance in Post-IPO Trading

This table presents regression analysis of Institutional Abnormal Outperformance in post-IPO institutional trading. The dependent variable is Institutional Abnormal Outperformance (defined in Table 6). Most independent variables are as defined before. Young/Large is a dummy variable that equals one if the IPO firm is young (younger than the sample mean age of 14 years) and the trading is done by a large institution (more than $10 billion in annualized dollar principal traded), and zero otherwise. Low Reputation/Large is a dummy variable that equals one if the IPO is underwritten by a low reputation lead underwriter (reputation rank lower than 9.1) and the trading is done by a large institution, and zero otherwise. The unit of observation is an IPO/institution pair. P-values, which are in parentheses, are adjusted using White's robust standard errors with clustering on IPOs. Statistical significance is indicated by *** for one percent level, ** for five percent level, and * for ten percent level.

	(1)	(2)	(3)	(4)
Log(Age+1)	-0.097***	-0.089**	-0.095**	-0.084*
	(0.007)	(0.028)	(0.031)	(0.063)
Log(Reputation)	-0.841***	-0.825***	-0.425*	-0.404*
	(0.002)	(0.003)	(0.052)	(0.062)
Initial Return	0.056	0.059	0.199***	0.201***
	(0.160)	(0.156)	(0.001)	(0.001)
Log(Proceeds)	0.203***	0.236***	0.258***	0.260***
	(<0.001)	(<0.001)	(0.003)	(0.003)
Log(Institution Size)	0.020***	0.019***	0.020***	0.007*
	(<0.001)	(<0.001)	(<0.001)	(0.089)
Bubble		-0.122	-0.032	-0.034
		(0.115)	(0.718)	(0.706)
NASDAQ		0.129	0.202**	0.202**
		(0.127)	(0.036)	(0.038)
High-Tech		0.026	0.068	0.067
		(0.847)	(0.626)	(0.627)
Financial		-0.156	-0.181	-0.185
		(0.124)	(0.113)	(0.105)
Venture Capital			-0.024	-0.029
			(0.841)	(0.809)
Lockup			0.205*	0.206*
			(0.099)	(0.096)
Log(ME)			-0.034	-0.037
			(0.664)	(0.643)
Log(BE/ME)			0.164**	0.162**
			(0.020)	(0.021)
Young/Large				0.108**
				(0.017)
Low Reputation/Large				0.018*
				(0.073)
Intercept	-2.410**	-3.075***	-3.694***	-3.434**
	(0.019)	(0.006)	(0.008)	(0.012)
N	20,424	20,424	19,636	19,636
Adj. R-Squared	0.030	0.034	0.054	0.054

Table 7. Regression Analysis of Institutional Trading and Subsequent Long-Run IPO Abnormal Performance

This table presents regression analysis of institutional trading over time and subsequent long-run IPO abnormal performance. Panel A presents results for all sample institutions. Panels B and C present results for large and small institutions (using $10 billion annualized dollar principal traded as the cutoff), respectively. The dependent variable is Subsequent Abnormal Return, which is the difference between Subsequent Raw Return and the matched Fama/French 25 Size and Book-to-Market portfolio buy-and-hold value-weighted return. Subsequent Raw Return is the IPO one-year buy-and-hold raw return starting after each of the 13 trading periods. If delisted, the CRSP delisting return is used. Most independent variables are as defined before. Net Buying for each trading period is the total shares bought by institutions minus the total shares sold by institutions normalized by the Shares Offered in the IPO. P-values are in parentheses. Statistical significance is indicated by *** for one percent level, ** for five percent level, and * for ten percent level.

Table 7. Panel A. All Institutions

Trading Period	First 2-Day	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
Net Buying	**1.144***	**0.941****	**1.584****	**1.194****	**0.972****	**0.225**	**0.290**	**0.619****	**0.067**	**-0.146**	**0.096**	**-0.016**	**-0.220**
	(0.056)	**(0.019)**	**(0.031)**	**(0.012)**	**(0.017)**	**(0.557)**	**(0.401)**	**(0.030)**	**(0.822)**	**(0.539)**	**(0.705)**	**(0.936)**	**(0.338)**
Log(Age+1)	0.153***	0.156***	0.153***	0.146***	0.127***	0.113***	0.113***	0.119***	0.102***	0.102***	0.085***	0.084***	0.084***
	(0.003)	(0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(0.001)	(<0.001)	(0.002)	(0.004)	(0.006)
Log(Reputation)	0.397**	0.185	0.132	0.067	0.101	0.149	0.072	0.117	0.093	0.068	-0.087	-0.089	-0.167
	(0.039)	(0.275)	(0.344)	(0.578)	(0.353)	(0.189)	(0.515)	(0.264)	(0.407)	(0.525)	(0.395)	(0.412)	(0.150)
Initial Return	-0.137*	-0.081	-0.062	-0.059	-0.058	-0.086**	-0.083**	-0.068*	-0.083*	-0.078*	-0.078**	-0.086**	-0.073
	(0.063)	(0.209)	(0.249)	(0.203)	(0.163)	(0.048)	(0.049)	(0.088)	(0.052)	(0.059)	(0.049)	(0.042)	(0.102)
Log(Proceeds)	-0.143	-0.065	-0.078	-0.039	-0.018	-0.025	-0.013	-0.010	-0.053	0.007	0.028	-0.018	0.019
	(0.187)	(0.493)	(0.316)	(0.563)	(0.768)	(0.691)	(0.834)	(0.861)	(0.397)	(0.911)	(0.628)	(0.764)	(0.775)
Bubble	-0.231**	-0.283***	-0.266***	-0.211***	-0.234***	-0.270***	-0.229***	-0.177***	-0.147**	-0.103	-0.100	-0.109*	-0.137**
	(0.047)	(0.006)	(0.002)	(0.004)	(<0.001)	(<0.001)	(0.001)	(0.005)	(0.030)	(0.108)	(0.107)	(0.098)	(0.049)
NASDAQ	-0.202	-0.103	-0.152	-0.179*	-0.110	-0.129	-0.064	-0.103	-0.173*	-0.196**	-0.146*	-0.146*	-0.141
	(0.190)	(0.445)	(0.175)	(0.063)	(0.207)	(0.155)	(0.465)	(0.218)	(0.055)	(0.022)	(0.074)	(0.094)	(0.129)
High-Tech	0.077	0.028	0.012	-0.010	-0.042	-0.059	-0.031	-0.059	-0.076	-0.069	-0.058	-0.038	-0.031
	(0.393)	(0.720)	(0.852)	(0.853)	(0.406)	(0.260)	(0.546)	(0.222)	(0.145)	(0.162)	(0.225)	(0.455)	(0.569)
Financial	0.142	0.086	0.113	0.119	0.128	0.099	0.138	0.104	0.144	0.131	0.099	0.064	0.076
	(0.419)	(0.579)	(0.376)	(0.277)	(0.198)	(0.342)	(0.171)	(0.278)	(0.162)	(0.180)	(0.289)	(0.518)	(0.474)
Venture Capital	-0.013	-0.029	-0.028	-0.037	-0.035	-0.007	0.058	0.025	0.028	0.018	0.024	0.045	0.068
	(0.891)	(0.738)	(0.696)	(0.545)	(0.526)	(0.909)	(0.301)	(0.642)	(0.622)	(0.744)	(0.644)	(0.413)	(0.246)
Lockup	-0.191**	-0.156*	-0.122*	-0.106*	-0.096*	-0.062	-0.056	-0.062	-0.060	-0.057	-0.029	-0.015	-0.036
	(0.044)	(0.061)	(0.075)	(0.074)	(0.072)	(0.270)	(0.302)	(0.228)	(0.280)	(0.281)	(0.561)	(0.786)	(0.529)
Log(ME)	0.016	0.020	0.024	0.008	-0.017	-0.025	-0.021	-0.057	-0.044	-0.083	-0.080	-0.055	-0.079
	(0.869)	(0.812)	(0.736)	(0.891)	(0.755)	(0.667)	(0.706)	(0.283)	(0.441)	(0.125)	(0.126)	(0.317)	(0.181)
Log(BE/ME)	-0.165**	-0.103	-0.057	-0.047	-0.042	-0.039	-0.023	-0.033	-0.044	-0.074*	-0.069*	-0.039	-0.048
	(0.023)	(0.106)	(0.274)	(0.294)	(0.301)	(0.360)	(0.576)	(0.399)	(0.294)	(0.067)	(0.072)	(0.341)	(0.266)
Intercept	1.202	0.089	0.441	0.164	0.239	0.527	0.286	0.852	1.503**	1.211**	1.055*	1.477**	1.449**
	(0.248)	(0.922)	(0.560)	(0.801)	(0.684)	(0.391)	(0.631)	(0.132)	(0.013)	(0.036)	(0.057)	(0.012)	(0.021)
N	864	864	864	864	864	864	864	864	864	864	864	864	864
Adj. R-Squared	0.033	0.038	0.053	0.070	0.078	0.076	0.063	0.073	0.058	0.064	0.057	0.052	0.050

Table 7. Panel B. Large Institutions

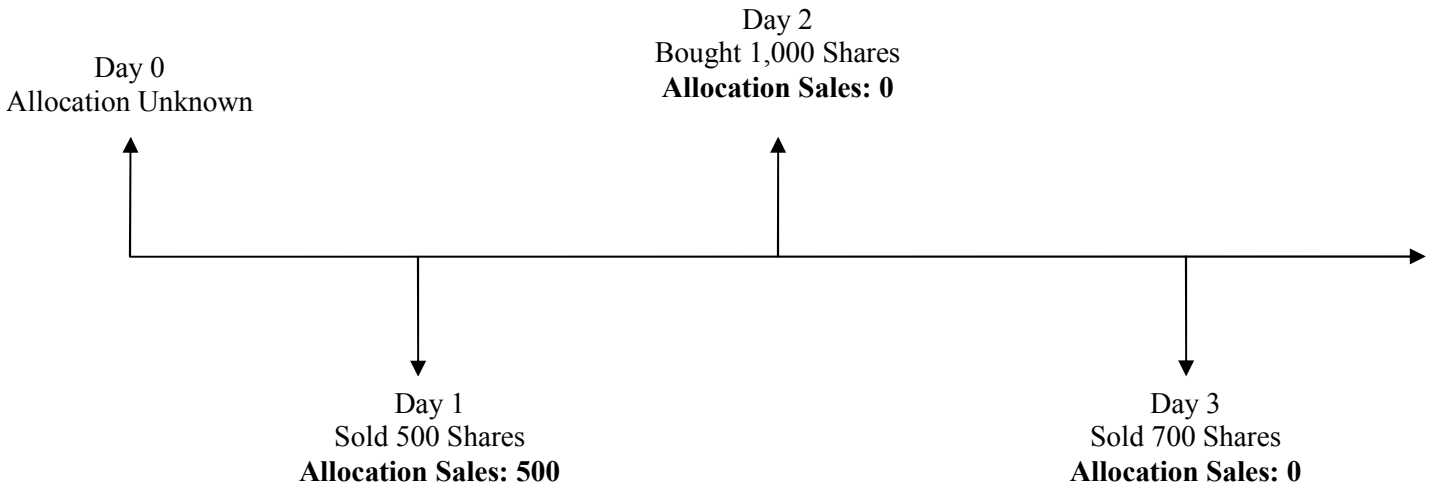
Trading Period	First 2-Day	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
Net Buying	**1.115***	**0.920****	**1.454***	**1.736*****	**1.173*****	**0.380**	**0.368**	**0.666****	**0.014**	**-0.212**	**-0.029**	**-0.012**	**-0.188**
	(0.076)	**(0.029)**	**(0.053)**	**(0.001)**	**(0.007)**	**(0.363)**	**(0.382)**	**(0.021)**	**(0.964)**	**(0.383)**	**(0.917)**	**(0.953)**	**(0.429)**
Log(Age+1)	0.153***	0.157***	0.154***	0.145***	0.127***	0.113***	0.114***	0.119***	0.102***	0.101***	0.085***	0.084***	0.084***
	(0.003)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(0.001)	(<0.001)	(0.002)	(0.004)	(0.006)
Log(Reputation)	0.403**	0.190	0.133	0.071	0.104	0.149	0.070	0.118	0.093	0.069	-0.086	-0.090	-0.167
	(0.037)	(0.262)	(0.341)	(0.556)	(0.337)	(0.190)	(0.523)	(0.259)	(0.407)	(0.518)	(0.403)	(0.411)	(0.149)
Initial Return	-0.137*	-0.081	-0.063	-0.057	-0.056	-0.086**	-0.083**	-0.069*	-0.083*	-0.077*	-0.075*	-0.086**	-0.072
	(0.063)	(0.210)	(0.239)	(0.216)	(0.177)	(0.049)	(0.049)	(0.086)	(0.052)	(0.060)	(0.059)	(0.041)	(0.104)
Log(Proceeds)	-0.143	-0.068	-0.080	-0.041	-0.016	-0.024	-0.012	-0.009	-0.054	0.006	0.027	-0.018	0.019
	(0.185)	(0.476)	(0.304)	(0.540)	(0.788)	(0.713)	(0.845)	(0.880)	(0.396)	(0.924)	(0.636)	(0.762)	(0.767)
Bubble	-0.239**	-0.293***	-0.269***	-0.223***	-0.238***	-0.270***	-0.232***	-0.179***	-0.148**	-0.103	-0.101	-0.109*	-0.137**
	(0.040)	(0.004)	(0.001)	(0.002)	(<0.001)	(<0.001)	(0.001)	(0.005)	(0.029)	(0.110)	(0.102)	(0.098)	(0.050)
NASDAQ	-0.199	-0.106	-0.151	-0.181*	-0.117	-0.131	-0.062	-0.102	-0.173*	-0.198**	-0.147*	-0.146*	-0.141
	(0.196)	(0.435)	(0.178)	(0.059)	(0.177)	(0.150)	(0.480)	(0.224)	(0.055)	(0.021)	(0.073)	(0.094)	(0.128)
High-Tech	0.074	0.027	0.012	-0.003	-0.039	-0.059	-0.032	-0.058	-0.076	-0.069	-0.057	-0.038	-0.031
	(0.412)	(0.735)	(0.847)	(0.963)	(0.442)	(0.259)	(0.537)	(0.230)	(0.146)	(0.163)	(0.232)	(0.454)	(0.562)
Financial	0.142	0.083	0.113	0.114	0.127	0.100	0.144	0.107	0.144	0.130	0.100	0.064	0.076
	(0.420)	(0.590)	(0.377)	(0.298)	(0.201)	(0.336)	(0.152)	(0.261)	(0.161)	(0.181)	(0.283)	(0.519)	(0.474)
Venture Capital	-0.014	-0.026	-0.028	-0.037	-0.032	-0.005	0.059	0.023	0.029	0.018	0.024	0.045	0.069
	(0.885)	(0.761)	(0.691)	(0.539)	(0.566)	(0.930)	(0.289)	(0.660)	(0.616)	(0.733)	(0.644)	(0.412)	(0.243)
Lockup	-0.191**	-0.155*	-0.122*	-0.106*	-0.096*	-0.061	-0.057	-0.062	-0.060	-0.057	-0.029	-0.015	-0.036
	(0.044)	(0.063)	(0.076)	(0.073)	(0.072)	(0.274)	(0.291)	(0.225)	(0.278)	(0.279)	(0.562)	(0.786)	(0.529)
Log(ME)	0.017	0.023	0.026	0.007	-0.021	-0.027	-0.022	-0.058	-0.044	-0.083	-0.079	-0.055	-0.079
	(0.864)	(0.789)	(0.715)	(0.909)	(0.706)	(0.642)	(0.698)	(0.276)	(0.444)	(0.127)	(0.127)	(0.318)	(0.178)
Log(BE/ME)	-0.164**	-0.100	-0.056	-0.045	-0.042	-0.039	-0.023	-0.034	-0.045	-0.074*	-0.069*	-0.039	-0.049
	(0.024)	(0.115)	(0.285)	(0.320)	(0.309)	(0.363)	(0.584)	(0.393)	(0.292)	(0.067)	(0.072)	(0.342)	(0.264)
Intercept	1.202	0.091	0.437	0.238	0.281	0.533	0.286	0.843	1.501**	1.219**	1.058*	1.478**	1.449**
	(0.249)	(0.921)	(0.564)	(0.714)	(0.631)	(0.385)	(0.631)	(0.135)	(0.014)	(0.035)	(0.056)	(0.012)	(0.021)
N	864	864	864	864	864	864	864	864	864	864	864	864	864
Adj. R-Squared	0.033	0.037	0.051	0.075	0.079	0.076	0.063	0.074	0.058	0.065	0.057	0.052	0.049

Table 7. Panel C. Small Institutions

Trading Period	First 2-Day	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
Net Buying	**2.197**	**1.221**	**3.531**	**-0.553**	**-0.873**	**-1.080**	**0.141**	**-0.627**	**1.233**	**3.389***	**1.357**	**-0.088**	**-1.182**
	(0.377)	**(0.383)**	**(0.253)**	**(0.527)**	**(0.557)**	**(0.404)**	**(0.823)**	**(0.664)**	**(0.383)**	**(0.065)**	**(0.110)**	**(0.920)**	**(0.320)**
Log(Age+1)	0.153***	0.156***	0.153***	0.144***	0.125***	0.114***	0.114***	0.116***	0.103***	0.100***	0.087***	0.084***	0.084***
	(0.003)	(0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(0.001)	(<0.001)	(0.001)	(0.004)	(0.006)
Log(Reputation)	0.387**	0.179	0.118	0.059	0.103	0.152	0.073	0.124	0.093	0.064	-0.092	-0.089	-0.171
	(0.045)	(0.292)	(0.399)	(0.627)	(0.346)	(0.181)	(0.505)	(0.235)	(0.407)	(0.550)	(0.368)	(0.413)	(0.140)
Initial Return	-0.131*	-0.076	-0.066	-0.062	-0.064	-0.086**	-0.083**	-0.069*	-0.087**	-0.087**	-0.076*	-0.086**	-0.072
	(0.076)	(0.240)	(0.218)	(0.179)	(0.126)	(0.048)	(0.049)	(0.085)	(0.043)	(0.035)	(0.051)	(0.040)	(0.102)
Log(Proceeds)	-0.138	-0.062	-0.081	-0.035	-0.038	-0.032	-0.015	-0.022	-0.058	0.004	0.024	-0.018	0.023
	(0.203)	(0.514)	(0.304)	(0.609)	(0.532)	(0.620)	(0.808)	(0.703)	(0.359)	(0.941)	(0.672)	(0.768)	(0.721)
Bubble	-0.232**	-0.295***	-0.264***	-0.229***	-0.253***	-0.281***	-0.234***	-0.195***	-0.149**	-0.090	-0.088	-0.109*	-0.134*
	(0.049)	(0.004)	(0.002)	(0.002)	(<0.001)	(<0.001)	(<0.001)	(0.002)	(0.028)	(0.166)	(0.157)	(0.097)	(0.055)
NASDAQ	-0.199	-0.097	-0.144	-0.173*	-0.122	-0.134	-0.063	-0.099	-0.175*	-0.200**	-0.155*	-0.146*	-0.137
	(0.198)	(0.476)	(0.199)	(0.074)	(0.165)	(0.142)	(0.476)	(0.236)	(0.052)	(0.020)	(0.059)	(0.096)	(0.138)
High-Tech	0.063	0.014	0.007	-0.003	-0.042	-0.059	-0.030	-0.057	-0.078	-0.071	-0.057	-0.038	-0.033
	(0.484)	(0.855)	(0.917)	(0.952)	(0.402)	(0.262)	(0.563)	(0.241)	(0.137)	(0.149)	(0.230)	(0.452)	(0.540)
Financial	0.144	0.093	0.105	0.122	0.108	0.100	0.142	0.110	0.144	0.137	0.091	0.065	0.076
	(0.414)	(0.547)	(0.409)	(0.268)	(0.277)	(0.333)	(0.162)	(0.253)	(0.160)	(0.161)	(0.333)	(0.517)	(0.474)
Venture Capital	-0.010	-0.026	-0.028	-0.030	-0.031	-0.004	0.058	0.030	0.029	0.017	0.025	0.045	0.066
	(0.917)	(0.761)	(0.690)	(0.622)	(0.574)	(0.946)	(0.298)	(0.575)	(0.609)	(0.749)	(0.636)	(0.415)	(0.259)
Lockup	-0.181*	-0.151*	-0.122*	-0.109*	-0.099*	-0.063	-0.057	-0.062	-0.063	-0.054	-0.028	-0.015	-0.034
	(0.057)	(0.071)	(0.076)	(0.067)	(0.065)	(0.258)	(0.295)	(0.228)	(0.252)	(0.301)	(0.577)	(0.784)	(0.550)
Log(ME)	0.016	0.027	0.035	0.008	0.001	-0.020	-0.019	-0.045	-0.040	-0.080	-0.076	-0.056	-0.081
	(0.869)	(0.751)	(0.622)	(0.899)	(0.983)	(0.727)	(0.728)	(0.394)	(0.481)	(0.139)	(0.144)	(0.317)	(0.170)
Log(BE/ME)	-0.164**	-0.103	-0.057	-0.048	-0.035	-0.037	-0.024	-0.032	-0.046	-0.076*	-0.067*	-0.039	-0.048
	(0.024)	(0.106)	(0.279)	(0.295)	(0.388)	(0.389)	(0.564)	(0.410)	(0.277)	(0.060)	(0.082)	(0.340)	(0.271)
Intercept	1.121	-0.079	0.294	0.132	0.283	0.553	0.289	0.846	1.514**	1.188**	1.051*	1.475**	1.407**
	(0.282)	(0.931)	(0.697)	(0.840)	(0.631)	(0.368)	(0.627)	(0.135)	(0.013)	(0.039)	(0.057)	(0.013)	(0.025)
N	864	864	864	864	864	864	864	864	864	864	864	864	864
Adj. R-Squared	0.030	0.033	0.049	0.064	0.072	0.076	0.063	0.068	0.059	0.068	0.060	0.052	0.050

Figure 1. Numerical Examples of Algorithm for Identifying Institutional IPO Allocation Sales

Example 1:



Example 2:

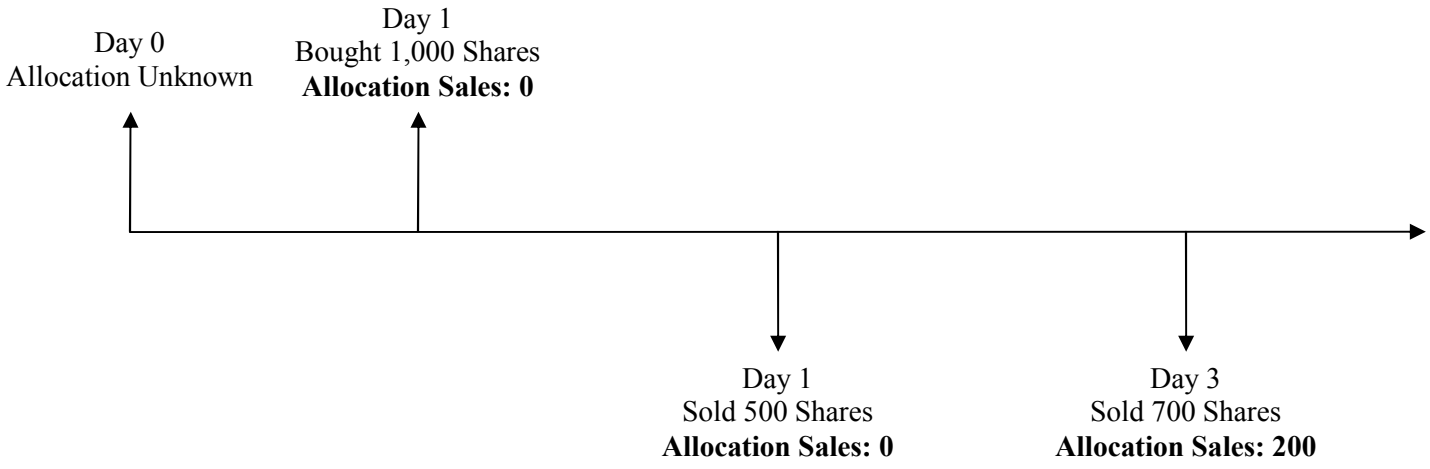


Figure 2. Institutional Trading and Subsequent Long-Run IPO Performance

This figure plots the relation between trading in IPOs by all sample institutions over time and subsequent long-run IPO performance. As before, the first year post-IPO is divided into 13 trading periods. Net Buying for each trading period is the total shares bought by all sample institutions minus the total shares sold by all sample institutions normalized by the Shares Offered in the IPO. For initial sample IPOs, the lowest, middle three, and highest quintiles of Net Buying are categorized as Low, Moderate, and High IPOs, respectively. Subsequent Raw Return is the IPO one-year buy-and-hold raw return starting after each of the 13 trading periods. If delisted, the CRSP delisting return is used. Subsequent Abnormal Return is the difference between Subsequent Raw Return and the matched Fama/French 25 Size and Book-to-Market portfolio buy-and-hold value-weighted return. The mean High - Low differences in Subsequent Raw and Abnormal Returns are plotted in the figure.