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When do high stock returns trigger equity issues? ☆

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ABSTRACT

One of the most prominent stylized facts in corporate finance is that equity issues tend to follow periods of high stock returns. We document that firms exhibit such timing behavior only in response to high returns that coincide with strong institutional investor demand. When not accompanied by institutional purchases, stock price increases have little impact on the likelihood of equity issuance. The results highlight the importance of market reception for the timing of equity issues.

1. Introduction

It is well-known that equity issues tend to follow periods of high stock returns. A firm's recent stock return is, in fact, a better predictor of its equity issuance behavior than most other factors that are relevant for financial policy. These observations have led many researchers to suggest that firms' equity issue decisions are largely driven by market timing considerations. Indeed, equity market timing is often described as the practice of issuing shares following a substantial runup in the stock price.[1]

In this paper, we take a closer look at the timing of equity issues and find that issuers do not respond to stock returns per se. High stock returns trigger equity issues when coupled with strong demand from institutional investors. When not accompanied by institutional purchases, high returns have little impact on the likelihood of equity issuance. In other words, potential issuers appear to treat stock returns and institutional investor demand as highly complementary factors.

The broad motivation behind our analysis is to understand the timing considerations equity issuers face in practice. While studies on market timing primarily focus on the impetus from high stock prices, practitioners often cite "market reception" as a key factor in deciding when to issue equity. A receptive market is described as one where equity can be issued at or close to the prevailing stock price—that is, without moving the stock price significantly downward. Practitioners' notion of market reception is clearly related to adverse selection-based theories of equity issuance, a link we further discuss below. Our basic objective in this paper is to identify an operational measure of market reception that can help characterize issuance behavior in the data.

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[1] See Section 2.1 for a review of prior empirical work on equity market timing.

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The specific measures that we utilize relate to institutional investor demand. We argue that recent institutional demand for a firm's stock is an important indicator of the market's likely reception of an equity issue by that firm. Institutional investors are generally considered to be sophisticated and better-informed; as such, their aggregate demand conveys information to the market. Strong institutional demand for a firm's stock reveals that several institutions have scrutinized the firm recently and then decided to buy its stock. This is likely to act as a certification regarding the firm's market valuation, alleviating adverse selection concerns and making the market more receptive to an equity issue at the prevailing stock price. Conversely, firms with attractive valuations but weak institutional demand may shy away from issuance, fearing that an issue decision may put substantial negative pressure on the stock price. These considerations motivate our focus on institutional investor demand as a potentially useful indicator of market reception.

Our empirical analysis concerns seasoned equity offerings (SEOs) and proceeds in two parts. In the first part we analyze the decision to conduct an SEO. As discussed above, our main finding in this regard is that high stock returns are more likely to trigger SEOs when accompanied by strong institutional investor demand. In particular, the issuance decision is highly sensitive to the strength of demand from new institutional shareholders (i.e., those that initiate positions in the stock). To give a sense for magnitudes, the unconditional per-quarter probability that a firm announces an SEO is 1.46% in our sample. When the previous-quarter stock return is in the top quintile of its distribution but new institutional holdings are in the bottom quintile of their distribution, the SEO announcement probability is 1.49%, which is close to the unconditional likelihood. However, when both the stock return and new institutional holdings are in their respective top quintiles, the SEO announcement probability jumps to 5.03%. Additional tests on other dimensions of the equity issuance decision confirm the positive response of issuers to institutional demand. Firms with higher values of new institutional holdings are not only more likely to announce SEOs, but also do so more quickly (i.e., announce earlier within a quarter), spend less time between the announcement and the offer, and raise substantially more in offer proceeds.

The findings discussed above are consistent with equity issues responding to institutional investor demand, but they may also reflect spurious correlations. A particular concern is that institutional demand is correlated with firm characteristics that affect the likelihood of equity issuance. While we control for a large set of observable firm characteristics in Probit regressions that predict SEO announcements, institutional demand may nevertheless reflect proprietary information that is not captured by observables. For example, it is possible that institutions identify firms with improving investment opportunities and purchase their stocks with the hope of profiting once firms' prospects become publicly known. It could then appear as if institutional demand predicts equity issuance, whereas in fact, both variables are driven by investment opportunities.

To address this potential concern we devise a number of tests. First, we analyze firms' investment expenditures and debt issuances in relation to institutional demand. If high-institutional demand firms are more likely to issue equity due to improved investment opportunities, then these firms should exhibit increased investment rates and possibly increased used of debt as well. We find that this is not the case; the strong institutional demand effect on equity issues does not carry over to changes in investment rates or debt issuance. Second, we replicate our main tests for (i) SEOs that are not intended for capital-raising purposes, and (ii) subsamples of firms that are unlikely to need external capital for financing investment. Examples of (i) are offers where the filing states non-investment purposes such as "shareholder use," or offers that include a high fraction of secondary shares owned by existing blockholders. An example of (ii) is the sample of firms with net financing surpluses. In all cases the findings parallel those from the base-case analysis.

Additional results shed further light on the relevance of institutional investor demand for the equity issuance decision. Equity issues respond strongly to spikes in new institutional holdings, but they do not significantly relate to the trading behavior of existing institutional shareholders. In an attempt to understand why new holdings matter, we analyze the size properties of these purchases. We find an increased frequency of large purchases during episodes of elevated new holdings. To the extent that they are regarded by the market as indications of informed trading, such large purchases may facilitate the certification role of institutional demand that we hypothesize.

We also explore how potential issuers obtain information about institutional demand. Anecdotal evidence suggests that firms utilize the help of their investment bankers in gauging demand conditions for their stocks. Investment banks that also provide prime brokerage services are of particular interest in this regard, since these banks have access to privileged information about their institutional clients' demand. Using a sample of firms with past underwriting relationships to prime broker investment banks, we analyze how the equity issuance decision responds to client versus non-client institutional demand. We find that new holdings by institutional clients of the firm's relationship bank do a much better job of predicting SEOs than new holdings by other institutional investors.

The second part of the analysis focuses on stock returns around and following the equity issuance decision. Of particular interest is the market's reaction to the SEO announcement, both immediate and during the announcement-to-offer period. Our main finding in this regard is that high-institutional demand issuers are able to sustain their stock prices at pre-announcement levels. As is well-known, SEO announcements generate negative stock price reactions, on average. This initial price reaction is negative in our sample as well, and similar for high- and low-institutional demand issuers. However, while stock prices continue to decline for low-institutional demand issuers until the offer date, they fully rebound from the initial negative reaction for high-institutional demand issuers. In other words, high-institutional demand issuers are able to complete their

offers at their pre-announcement stock price levels, on average. We interpret this finding as reflecting the positive impact of institutional demand on market reception.

The results discussed above concern institutional investor demand prior to the announcement of the issuance decision. We also examine institutional investor demand around the offer and its impact on issuers' stock returns. We find that issuers with high offer-period institutional demand experience substantial stock price gains in the immediate post-offer period. The evidence suggests that the market pays close attention to news about offer-period institutional demand, confirming the informational role institutional investors play in equity issues.

Finally we examine the long-run stock returns of issuers. Previous research has shown that SEOs underperform in the long run. Whether such underperformance is due to market timing is a source of ongoing debate in the literature. The results discussed above show that firms strongly time their equity issues to coincide with high institutional investor demand. Furthermore, high-institutional demand issuers exhibit substantially better stock return performance than low-institutional demand issuers around and following the SEO. Accordingly, one might suspect long-run underperformance to concentrate among high-institutional demand issuers. We do not find any convincing evidence in this regard. While we confirm the finding in previous studies that SEOs underperform in general, there is little evidence of stronger underperformance for issuers with high institutional demand. In particular, the substantial short-run gains of high-institutional demand issuers that we discuss above are not reversed in the long run.

Overall, our analysis contributes toward a more complete characterization of the timing of equity issues. Prior empirical work in this area has largely focused on valuation-based variables (e.g., stock returns, market-to-book ratios) in identifying what issuers perceive as favorable market conditions. Our results refine prior findings by pointing to the relevance of factors that are not summarized by issuers' stock prices. Potential issuers appear to care as much about market reception as they do about high valuations.

The remainder of the paper is organized as follows. Section 2 discusses the broad and specific motivations for the study. Section 3 describes the empirical setup. Sections 4 and 5 present the results. Section 6 concludes. Appendix A presents a simple model that formalizes some elements of the discussion in Section 2. Appendix B lists variable definitions and data sources.

2. The timing of equity issues

2.1. Background and motivation

A large body of empirical work in corporate finance analyzes the timing of equity issues.[2] Research in this area focuses on three main findings. First and of particular importance for the current study is the tendency of firms to issue equity when their market values are high relative to book or past market values. This finding is often interpreted as evidence of market timing attempts.[3] The second approach is to detect market timing ex post by examining long-run stock returns of issuers. While the basic finding in this regard is that issuers exhibit low returns, there is an ongoing debate in the literature about whether these low returns result from successful timing.[4] Finally, a number of recent studies analyze the effects of market timing on firms' capital structures and suggest that these effects may be quite persistent.[5]

The literature described above defines equity market timing as the practice of issuing shares when equity is overvalued. The idea is that firm insiders, having an informational advantage over outsiders, can identify and exploit instances in which the firm's market value substantially exceeds its intrinsic value. There is an obvious difficulty with this idea: firm insiders would naturally want to exploit their informational advantage, but why would investors be systematically fooled? In a rational market, stock price reactions to issue announcements should correct any predictable overvaluation and ensure that the newly issued shares are fairly priced, on average (see, for example; Myers and Majluf, 1984).

The market timing hypothesis departs from the rational perspective by questioning investors' ability to fully account for issuers' opportunistic behavior. Proponents of the market timing view argue that the market reactions to SEO announcements, while negative on average, are too small to have a meaningful impact on firms' equity issuance decisions.[6] However, SEOs clearly constitute a non-random sample. As the practitioner view mentioned above suggests, firms are likely to issue equity only when they anticipate the market reception to be relatively favorable. Thus, small SEO announcement effects

[2] Studies on equity market timing primarily focus on public equity offerings. Firms can issue equity through other channels as well, such as private placements, stock-financed acquisitions, or stock-based compensation. We follow the extant timing literature and restrict our attention to SEOs. In unreported analysis, we extended the sample to include private placements of equity by public firms. The results with the extended sample are quantitatively similar to those reported here.

[3] Empirical evidence can be found in Taggart (1977), Marsh (1982), Jalilvand and Harris (1984), Asquith and Mullins (1986), Rajan and Zingales (1995), Jung, Kim, and Stulz (1996), Pagano, Panetta, and Zingales (1998), and Hovakimian, Opler, and Titman (2001). Also, survey evidence in Graham and Harvey (2001) indicates that recent stock price performance is one of the most important factors affecting the equity issuance decision.

[4] Low post-issue stock returns are first documented by Ritter (1991) in the context of IPOs and Loughran and Ritter (1995) and Spiess and Affleck-Graves (1995) for SEOs. Market timing interpretation of these findings has been countered by alternative explanations based on return benchmark misspecification (Brav, Geczy, and Gompers, 2000; Eckbo, Masulis, and Norli, 2000; Carlson, Fisher, and Giammarino, 2006).

[5] See Baker and Wurgler (2002). As with long-run underperformance, the persistence findings have generated an active debate in recent work. Huang and Ritter (2009) present supporting evidence, while a number of papers question the robustness (Altı, 2006; Kayhan and Titman, 2007) or the market-timing interpretation (Hennessy and Whited, 2005) of Baker and Wurgler's findings.

[6] For example, Loughran and Ritter (1995) write "...does it make sense that a firm would wait years to issue equity just to save 10 cents on a $25 issue? Our focus is on whether the company can sell at an offer price of $28.80 rather than $20, not whether it will save 10 cents."

observed in the data do not necessarily imply that stock prices are generally insensitive to equity issuance decisions.

Our broad objective in this paper is to shed light on the ease or difficulty of market timing. In other words, we would like to assess whether and to what extent firms can issue equity at or close to their prevailing stock prices. A direct answer to this question is difficult to obtain since, as pointed out above, market reactions are observed only in the case of firms that choose to issue. We take a different route instead and focus on potential *ex ante indicators* of market reception. In doing so, we pay particular attention to firms with high recent stock returns, as the extant literature offers these firms to be the prime candidates for engaging in market timing attempts.

2.2. Institutional investor demand and the equity issuance decision

Our specific focus on institutional investors is motivated by the informational role they play in equity markets. Institutions are professional investors (mutual funds, pension funds, etc.) who expend substantial resources on stock analysis. As such, they are generally considered to be more sophisticated and better-informed relative to other types of market participants (e.g., individual or retail investors, market makers, etc.). This is not to say that institutions always share the same views; they may and often do trade against each other. However, there are also episodes in which relatively large numbers of institutions trade in the same direction, revealing the presence of a shared and strong signal about a firm's value. It is during such episodes that institutional demand conveys substantial valuation-relevant information to the market.[7]

In the context of equity issues, institutional investor demand may be particularly relevant for two reasons. First, market participants are likely to face relatively lower valuation uncertainty if recent institutional demand for the issuer's stock has been strong. As discussed earlier, equity issuers tend to have very high prior stock returns. Presumably, events that induce such big price runups also increase valuation uncertainty and room for asymmetric information. The presence of a large number of institutions purchasing the stock during the runup may alleviate such concerns, as it implies that the firm has been under substantial institutional scrutiny. In effect, strong institutional demand can act as third-party certification regarding the issuer's stock price.

[7] Our description of the informational role of institutional demand is in line with empirical evidence. Sias, Starks, and Titman (2006) find that aggregate institutional demand has a strongly positive contemporaneous impact on stock prices. They also show that this price impact is largely permanent, indicating that it results from the information content of institutions' trades (as opposed to temporary price pressure). There is also a large literature analyzing the return performance of institutional investors. The basic finding in this literature is that institutions as a group do not substantially beat their return benchmarks (see, for example; Daniel, Grinblatt, Titman, and Wermers, 1997). Coupled with the permanent price impact mentioned above, this finding implies that information produced by institutions largely gets revealed through trading and incorporated into stock prices.

The second reason concerns stock price changes during the offer period. Issuers typically complete their offers several weeks after announcing them, and trading during this period allows new information to get incorporated into the stock price. In particular, informed investors' assessment of the equity issue decision gets reflected in the stock price through their trading demand. For example, these investors may start selling the stock if they identify the equity issue as an opportunistic attempt, but hold onto their shares or buy more otherwise. The informational efficiency of this process (in the sense of moving the stock price closer to intrinsic value) depends on the presence of informed demand, which is more likely for issuers whose stocks were subject to heightened institutional scrutiny in the recent past.

The above observations suggest that increased institutional demand, by facilitating a more informative stock price, may alleviate adverse selection concerns in equity issuance. Reduced adverse selection, in turn, implies a more receptive market in which equity can be issued without substantially depressing the stock price. Thus, to the extent that market reception constitutes a major concern for potential issuers, they are likely to target periods of strong institutional demand to execute their equity issues. At a broad level, this prediction is similar to the timing implications of time-varying adverse selection theories (Korajczyk, Lucas, and McDonald, 1992; Choe, Masulis, and Nanda, 1993). However, the specific effects of institutional demand discussed above are novel and may require further theoretical motivation. To this end, we provide a simple model in Appendix A that formalizes elements of the discussion in this section. The model incorporates informed institutional trading into the standard framework of financing under asymmetric information.

It is important to emphasize that a positive response of equity issues to institutional investor demand does not constitute a tautological or mechanical outcome. In product markets, increased demand naturally triggers increased supply. In financial asset markets, however, there exists a seller for every buyer. When institutions substantially increase their holdings of a stock, there must be other types of investors (e.g., individuals) who substantially reduce their holdings. Thus, increased institutional demand does not necessarily imply an opportunity for the firm to profitably increase the supply of its stock. It is rather the informational role of institutional demand—that relatively well-informed investors are buying the stock—that has implications for the firm's equity issuance behavior. Our analysis focuses on these implications.

3. Empirical setup

3.1. Data and sample construction

The initial sample of "potential SEO announcers" consists of all firm-quarter observations in the intersection of CRSP, Compustat, and CDA/Spectrum Institutional (13F) databases for the 84 quarters from 1985:1 to 2005:4. We restrict the sample to exclude financial firms (SIC codes 6000–6999), utilities (SIC codes 4900–4949), and firms that have issued equity through public placements (IPOs and SEOs) within

the previous two quarters.[8] In most of our analysis, we exclude firms that had less than 5% institutional ownership in at least one of the previous four quarters. We also exclude foreign firms and firm-quarter observations in which there are fewer than ten institutional shareholders or the stock price is less than $5. Our final sample of potential SEO announcers consists of 169, 141 firm-quarter observations.

We use data from Securities Data Corporation (SDC) to identify SEO filing announcement and offer dates. The initial SEO announcements sample consists of all S.E.C. registration filings by firms that are in our final sample of potential SEO announcers. We restrict the sample to exclude spinoffs, unit offers, and rights offerings. Our final SEO sample consists of 2,614 announcements and 2,203 completed offers.

We use the CDA/Spectrum database to calculate the institutional ownership and demand variables.[9] CDA/Spectrum reports quarterly snapshots of institutional investors' portfolios extracted from 13F reports filed with the SEC.[10] The types of institutions covered by this database are banks, insurance companies, investment companies, independent investment advisors, and pension funds. As in previous studies that use these data, we approximate institutions' quarterly trades by calculating the difference in their holdings between two consecutive reports.

Throughout the analysis we use stock returns that are characteristic-adjusted with respect to size and book-to-market (B/M) benchmarks.[11] To construct the benchmark portfolios used in quarter t, firms are first sorted into five size portfolios based on their market equity at the beginning of quarter $t-1$ using NYSE size quintile breakpoints. Within each of these size portfolios, firms are then sorted into five B/M portfolios based on their book equity divided by market equity at the beginning of quarter $t-1$. The characteristic-adjusted stock return is defined as the raw stock return minus the equal-weighted average return of the benchmark portfolio to which the stock is assigned. In calculating the equal-weighted average return of the benchmark portfolio for a given stock, we exclude the stock itself and stocks of other firms that have conducted SEOs over the past three years.

3.2. Definitions and summary statistics of institutional demand variables

Institutional investor demand for a given stock can be measured in several different ways. In this regard, we make two particular choices. First, we use variables that reflect changes in (as opposed to levels of) institutional holdings. While clearly informative about institutions' views, level-based variables are affected by other factors that create noise for our purposes. For example, one would expect certain types of stocks (e.g., larger, more liquid) to have higher levels of institutional ownership. Change-based variables track demand shifts more closely; they also provide more meaningful comparisons to stock returns (which also measure changes). Second, our demand variables are count-based (e.g., the number of institutions purchasing the stock). The alternative would be to aggregate trades across institutions (e.g., the aggregate number of shares purchased by all institutions). Our choice is motivated by evidence reported elsewhere that count-based variables capture the information content of institutional investor demand more closely.[12] However, the results are quantitatively similar when we use the aggregate number of shares purchased in defining our variables.

Specifically, we construct three institutional demand variables for each stock i-quarter t pair. The main variable is *new holdings*, defined as the number of institutions that initiate a holding in stock i in quarter t. The second variable is *change in existing holdings*, defined as the number of existing institutional shareholders that increase their holdings minus the number of those that decrease or terminate their holdings in stock i in quarter t. The third variable is *terminated holdings*, defined as the number of existing institutional shareholders that terminate their holdings in stock i in quarter t. All three variables are normalized by the number of institutional shareholders of the stock at the beginning of quarter t. In calculating these institutional demand variables, we restrict attention to firms that have more than 5% institutional ownership during all of the past four quarters.[13]

Panel A of Table 1 reports distribution statistics of the institutional demand variables for three different samples: the unconditional sample of all firm-quarters (A.1), firm-quarters that immediately precede SEO announcements (A.2), and firm-quarters in which equity offers take place (A.3). Relative to its unconditional distribution, the variable *new holdings* is unusually high in the quarter prior to an SEO announcement. Notice that this is not the case for *change in existing holdings* and *terminated holdings*; these variables' pre-SEO announcement distributions are very similar to their unconditional distributions. These findings provide a first glimpse at the impact of institutional demand on the issuance decision, which we analyze in greater detail in the next section. As one would expect, *new holdings* tends to be very high in the offer quarter (A.3); this simply reflects the fact that the placement of newly issued shares creates new institutional shareholders. Perhaps more surprising is the

[8] Firms that have issued equity through private placements are not excluded from the sample.

[9] Definitions of variables used throughout the paper and the corresponding data sources are listed in Appendix B.

[10] Institutions are allowed to omit reporting small positions, defined as those that meet both of the following two criteria: (i) the institution holds less than 10,000 shares of a given issuer; (ii) the aggregate fair market value of the holdings in the same issuer is less than $200,000.

[11] We use characteristic-adjusted stock returns to isolate firm-specific changes in stock prices. The results are similar when raw returns are used instead.

[12] See Sias, Starks, and Titman (2006), who show that stock returns are more strongly correlated with contemporaneous changes in the number of institutional shareholders than contemporaneous changes in institutional ownership.

[13] Another, and perhaps more natural, measure of institutional demand is the change in the number of institutional shareholders (which equals *new holdings* minus *terminated holdings*). Our results are quantitatively similar when that alternative measure is used, but we find that all the explanatory power is due to *new holdings*, not *terminated holdings*. Accordingly, we present the results using the breakdown of institutional demand described in the text.

Table 1
Summary statistics of institutional demand variables.

The table reports the summary statistics of institutional demand variables, which are calculated for each stock *i*-quarter *t* pair. The institutional demand variables (*new holdings*, *change in existing holdings*, and *terminated holdings*) are defined in Appendix B. All three institutional demand variables are normalized by the number of institutional shareholders of the stock at the beginning of quarter *t*. Our sample of potential SEO announcers consists of 169,141 firm-quarter observations from 1985:1 to 2005:4. The sample is restricted to firm-quarters for which the firm had more than 5% institutional ownership during the past four quarters. Panel A presents the distribution statistics of the institutional demand variables, which are reported in percentage terms. Panel B reports the autocorrelations and cross-correlations of the institutional demand variables. Panel C reports the correlations of the institutional demand variables with contemporaneous firm and stock characteristics. Panel D reports the correlations of the institutional demand variables with lagged, contemporaneous, and lead characteristic-adjusted stock returns. All the statistics reported in Panels B through D are time-series averages of quarterly cross-sectional correlations.

Panel A: Distribution

		Percentile				
	Mean	10th	25th	50th	75th	90th
1. All firm-quarters						
New holdings	14.88	3.85	7.27	12.03	18.87	28.57
Change in existing holdings	−10.25	−33.33	−20.91	−9.52	0.00	11.39
Terminated holdings	13.21	4.55	7.50	11.67	17.33	24.00
2. Firm-quarters preceding SEO announcements						
New holdings	25.88	7.69	13.33	20.37	32.10	50.00
Change in existing holdings	−9.18	−34.92	−21.05	−8.42	3.17	15.79
Terminated holdings	13.11	5.00	8.08	12.00	16.92	22.73
3. Offer firm-quarters						
New holdings	44.34	15.27	23.33	35.24	56.00	82.22
Change in existing holdings	−16.50	−45.24	−32.58	−17.65	−0.94	14.00
Terminated holdings	13.06	4.87	8.00	11.86	16.67	21.74

Panel B: Autocorrelation and cross-correlation (all firm-quarters)

	Autocorrelation				Cross-correlation	
	Lag 1	Lag 2	Lag 3	Lag 4	*Existing*	*Terminated*
New holdings	0.220	0.173	0.143	0.118	−0.023	0.026
Change in existing holdings	0.151	0.120	0.095	0.084	–	−0.468
Terminated holdings	0.263	0.225	0.204	0.192	–	–

Panel C: Correlation with contemporaneous firm and stock characteristics (all firm-quarters)

	M/B	*Firm age*	*Firm size*	*Volatility*	*Turnover*
New holdings	0.188	−0.223	−0.158	0.153	0.205
Change in existing holdings	−0.009	0.029	−0.038	−0.114	−0.167
Terminated holdings	0.009	−0.272	−0.183	0.289	0.336

Panel D: Correlation with stock returns (all firm-quarters)

	Lag 2	Lag 1	Lag 0	Lead 1	Lead 2
New holdings	0.130	0.195	0.351	0.037	0.015
Change in existing holdings	0.027	0.046	0.038	0.019	0.014
Terminated holdings	−0.105	−0.149	−0.035	−0.032	−0.024

offer-quarter trading behavior of existing institutional shareholders. Relative to a typical quarter (A.1), these investors appear to be more inclined to reduce than increase their holdings in the offer quarter.

Panels B through D of Table 1 report various correlations of the institutional demand variables. The reported statistics are calculated as time-series averages of quarterly cross-sectional correlations. The highlights from these panels are as follows:

- All three institutional demand variables exhibit moderate positive autocorrelation. There is very little cross correlation between *new holdings* and either of the other two demand measures.
- *New holdings* is positively correlated with market-to-book ratio, volatility, and turnover, and negatively correlated with firm age and firm size. However, these correlations are quite small in magnitude. Position terminations are more likely for younger firms, smaller firms, and stocks with high volatility and high turnover.
- *New holdings* (*terminated holdings*) is positively (negatively) correlated with past stock returns. This is consistent with the finding in previous studies that

institutional investors tend to engage in positive-feedback trading (see, for example; Grinblatt, Titman, and Wermers, 1995). *New holdings* is positively correlated also with the contemporaneous (i.e., same quarter) stock return, and this correlation is stronger than those with past returns. This higher correlation likely reflects the contemporaneous price impact of institutional demand. Interestingly, *change in existing holdings* has almost no relationship to past and contemporaneous returns.

Overall, the institutional demand variables appear to exhibit substantial variations that are independent of their own past values, firm characteristics, and stock returns.

4. The equity issuance decision

4.1. The main results

In this section, we present our main results that relate the likelihood of equity issuance to stock returns and institutional investor demand. We analyze the equity issuance decision at quarterly frequency and measure it by whether the firm makes an SEO announcement during the quarter. Thus, the quantity of interest is the probability that a firm-quarter observation is associated with an SEO announcement. For ease of interpretation and to better capture non-linear relationships, we first report the results in the form of quintile sorts. Subsequently, we confirm the main findings with Probit regression analyses as well.

It is well-known that firms are more likely to issue equity following periods of high stock returns. We start by verifying this stylized fact in our sample. In each quarter, we sort firms into quintiles based on previous quarter's characteristic-adjusted stock return. We then calculate the percentage of firms within each quintile that announce an SEO during the quarter. Panel A of Table 2 reports the time-series averages of these percentages and the *t*-statistic of the difference between the highest and the lowest return quintiles.[14]

As expected, stock returns have a strong impact on the equity issuance decision. Firms in the highest return quintile are ten times more likely to announce SEOs than firms in the lowest return quintile. We also report the results separately for subsamples of firms with more and less than 5% institutional ownership. Notice that firms with low institutional ownership are less likely to issue equity in general. Of more interest is the subsample of firms with more than 5% institutional ownership, which constitutes the main sample for the rest of the analysis in the paper.[15] Here, we continue to observe the strong relationship between stock returns and the equity issuance decision. Of the 2,614 SEO announcements in this sample, 1,226, or 47%, are by firms that are in the highest stock return quintile (the numbers of SEO announcements are not reported in Table 2).

Next, we analyze the likelihood of an SEO announcement as a function of both stock returns and institutional investor demand. In each quarter, firms are sorted independently into quintiles based on previous quarter's characteristic-adjusted stock return and institutional investor demand. Within each return-demand group, we calculate the percentage of firms that announce an SEO during the quarter. The results are reported in Panels B through E of Table 2, where the institutional demand variables are *new holdings*, *lagged new holdings*, *change in existing holdings*, and *terminated holdings*, respectively.

Panel B presents our main result, namely, that equity issues tend to follow stock price runups that coincide with strong institutional investor demand. When the stock return is in its highest quintile but *new holdings* is in its lowest quintile, the probability that the firm announces an SEO is only 1.49%. This is quite low and similar to the unconditional announcement probability, which is 1.46% in our sample. When both the stock return and *new holdings* are in their highest quintiles, however, the announcement probability jumps up to 5.03%. To give a sense for the number of announcements, of the 1,336 announcements in the highest return quintile, 737 are by firms that are also in the highest demand quintile, whereas only 36 are in the lowest demand quintile. Notice that the two sorting variables have a strong non-linear interaction effect on the issuance decision. Moving from an adjacent group to the highest return-highest demand group increases the SEO announcement probability by at least two percentage points.

The demand measure in Panel B is *new holdings* in the quarter immediately before the quarter in which the SEO announcement may take place. A potential concern in this specification is that firms may have very little time to make their issuance decisions after observing institutional demand. First, the quarterly holdings data that we use become available to the public and hence to firms only after the mid-point of the subsequent quarter. Second, planning for an SEO may take some time. Clearly, a firm without any SEO plans and no indication of institutional demand prior to the mid-point of the quarter would be time-pressed to decide on and announce an SEO by the end of the quarter.

These concerns may not be valid for many issuers. Most firms are likely to have a good idea about their financing needs and strategies long before they file for an SEO. Furthermore, our hypotheses about the relevance of institutional demand do not require firms to have detailed reports on institutional holdings. What matters is that firms know current institutional demand for their stocks to be high, which can be gleaned from the price impact of order flow, news in financial media, or even rumors. Nevertheless, to allow for more time for issuers to respond to institutional demand, we repeat the analysis in Panel B by lagging *new holdings* by one more quarter. The results, reported in Panel C, continue to exhibit a strong impact of *new holdings* on the issuance decision. A comparison with Panel B in fact shows that the positive interaction effect of institutional demand and the stock return is even more visible when demand is measured via *lagged new holdings*.

[14] The *t*-statistics in this panel, as well as all others in Tables 2 through 6, are based on time-series standard errors that are calculated with a four-quarter lag Newey-West correction.

[15] Recall that we calculate the institutional demand variables only for firms with more than 5% institutional ownership during the past four quarters.

In Panels D and E we repeat the same exercise by sorting firms based on *change in existing holdings* and *terminated holdings*, respectively. The picture that emerges here is quite different than in Panels B and C. Within any return quintile, moving from the lowest to the highest demand group causes at best a small increase in the announcement probability. For *terminated holdings*, the high-institutional demand effect in fact seems to be negative (i.e., fewer

Table 2
Probability of SEO announcements.

The table reports quarterly SEO announcement probabilities as functions of previous quarter's characteristic-adjusted stock return and institutional demand. At the beginning of each quarter, firms are independently sorted into five groups based on previous quarter's stock return and institutional demand. Panel A reports the announcement probability for each return group, while Panels B through E report the announcement probability for each return-institutional demand group. The institutional demand variable is *new holdings* in Panel B, *lagged new holdings* in Panel C, *change in existing holdings* in Panel D, and *terminated holdings* in Panel E. Announcement probabilities are calculated as time-series averages of quarterly probabilities and reported in percentage terms. Our sample of potential SEO announcers consists of 169,141 firm-quarter observations from 1985:1 to 2005:4. The *t*-statistics reported in parentheses are adjusted using Newey-West correction for heteroskedasticity and serial correlation.

Panel A: Univariate sort on stock return

	Return quintile						
	Low	2	3	4	High		
Average stock return	−35%	−14%	−3%	9%	44%		
SEO announcement probability						High minus low	
All observations	0.26	0.54	0.85	1.41	2.54	2.28	(10.91)
Institutional ownership $<5\%$	0.21	0.42	0.73	0.99	1.93	1.72	(8.25)
Institutional ownership $\geq 5\%$	0.40	0.75	1.00	1.66	3.29	2.89	(11.02)

Panel B: Bivariate sort on stock return and new holdings

	Return quintile						
	Low	2	3	4	High	High minus low	
Low institutional demand	0.23	0.41	0.36	0.76	1.49	1.26	(4.43)
2	0.33	0.53	0.74	0.94	1.45	1.12	(3.85)
3	0.48	0.70	1.08	1.31	1.85	1.37	(6.52)
4	0.37	1.06	1.40	1.82	2.43	2.06	(6.34)
High institutional demand	0.82	1.60	2.08	3.46	5.03	4.21	(10.37)
High minus low	0.59	1.18	1.72	2.71	3.54		
	(3.07)	(5.37)	(5.64)	(9.41)	(8.43)		

Panel C: Bivariate sort on stock return and lagged new holdings

	Return quintile						
	Low	2	3	4	High	High minus low	
Low institutional demand	0.21	0.38	0.33	0.87	1.72	1.51	(4.93)
2	0.35	0.45	0.80	0.96	2.10	1.74	(7.87)
3	0.35	0.78	0.82	1.26	2.34	1.99	(6.35)
4	0.40	0.76	1.11	2.10	3.36	2.96	(10.40)
High institutional demand	0.65	1.57	2.40	3.50	5.83	5.18	(10.08)
High minus low	0.44	1.19	2.07	2.63	4.11		
	(3.18)	(6.03)	(7.36)	(9.37)	(9.90)		

Panel D: Bivariate sort on stock return and change in existing holdings

	Return quintile						
	Low	2	3	4	High	High minus low	
Low institutional demand	0.42	0.86	1.16	1.93	3.40	2.98	(7.90)
2	0.39	0.54	0.92	1.45	2.94	2.55	(8.66)
3	0.38	0.55	1.04	1.60	3.08	2.70	(8.47)
4	0.40	0.70	0.92	1.40	3.49	3.09	(9.01)
High institutional demand	0.41	1.07	1.06	1.93	3.70	3.29	(10.32)
High minus low	−0.01	0.21	−0.11	0.00	0.30		
	(−0.11)	(1.08)	(−0.55)	(−0.01)	(0.87)		

Table 2 (*continued*)

Panel E: Bivariate sort on stock return and terminated holdings

	Return quintile						
	Low	2	3	4	High	High minus low	
Low institutional demand	0.36	0.80	1.02	1.97	3.30	2.93	(7.77)
2	0.50	0.95	1.34	1.99	3.65	3.15	(8.69)
3	0.27	0.86	1.18	1.87	3.38	3.11	(10.45)
4	0.43	0.65	0.97	1.64	3.19	2.76	(8.40)
High institutional demand	0.35	0.50	0.58	1.08	2.94	2.59	(9.96)
High minus low	−0.02 (−0.12)	−0.30 (−2.94)	−0.45 (−2.47)	−0.89 (−3.51)	−0.36 (−1.27)		

terminations are associated with lower announcement probability), although the magnitude of this negative effect is quite small. Overall, *change in existing holdings* and *terminated holdings* do not appear to have a substantial impact on the equity issuance decision.

The analyses in Table 2 do not take into account various other factors that may affect the equity issue decision. To control for such factors, we resort to multivariate Probit regressions. We report the Probit results only for *new holdings* and *lagged new holdings*, since these are the demand variables that significantly predict SEO announcements. Replicating the Probit regressions for *change in existing holdings* and *terminated holdings* confirms the conclusion from Table 2 that these two variables do not play a substantial role in predicting SEO announcements.

Specifically, we estimate two panel Probit regressions on the sample of all firm-quarter observations. The first specification is given by

$$\begin{aligned}\Pr(\text{SEO announcement}) = \text{Probit}\,(&\textit{stock return},\\ &\textit{high inst. demand}, \textit{high inst. demand} \times \textit{stock return},\\ &\textit{medium inst. demand}, \textit{medium inst. demand} \times \textit{stock return},\\ &\text{lagged six} - \text{month stock return}, M/B,\\ &\text{firm size, firm age, volatility, IPO dummy,}\\ &\text{profitability, investment, R\&D, leverage,}\\ &\text{turnover, institutional ownership, quarter and industry F.E.}).\end{aligned} \tag{1}$$

Regression (1) estimates the probability that a firm announces an SEO in quarter $t+1$. The main variables of interest are in italics. *Stock return* is the characteristic-adjusted stock return in quarter *t*. *High institutional demand* (*medium institutional demand*) is a dummy variable that takes the value of one when institutional demand is in the highest quintile (the middle three quintiles).[16] We measure institutional demand via *new holdings* in quarter t in one specification and in quarter $t-1$ (i.e., lagged demand) in another. Also included are interaction terms of *high institutional demand* and *medium institutional demand* with *stock return*.[17]

The other variables in (1) constitute the controls and are measured as of the beginning of quarter *t*. As indicated in Section 3.2, *new holdings* is positively correlated with past stock returns, suggesting the use of positive-feedback trading strategies by some institutions. This raises the possibility that the impact of *new holdings* on the equity issuance decision is spurious and driven by stock returns prior to the most recent quarter. Lagged six-month stock return is included in (1) to address this concern. Market-to-book ratio M/B is relevant for equity issues both as a measure of market timing opportunities and as an indicator of growth prospects. The firm characteristics in the fifth and sixth lines of (1) are known from previous studies to be important determinants of financial policy. The stock characteristics in the last line of (1) are included to control for factors that relate to the liquidity of the stock, which is likely to affect the equity issuance decision as well. Also included are quarter and industry fixed effects.

The first two columns of Panel A of Table 3 report the estimation results (the marginal effects of the explanatory variables in (1) and their associated *Z*-scores). The main patterns that emerge in this multivariate setting parallel those in Table 2. In particular, both *new holdings* and *lagged new holdings* continue to have strong own and interaction effects on the issuance decision even after controlling for several firm and stock characteristics.

The second Probit regression, reported in the third column of Panel A of Table 3, is similar to (1) but excludes the stock return, demand dummies, and their interactions:

$$\begin{aligned}\Pr(\text{SEO announcement})\\ = \text{Probit}(&\text{lagged six} - \text{month stock return}, M/B,\\ &\text{firm size, firm age, volatility, IPO dummy,profitability,}\\ &\text{investment, R\&D, leverage,turnover,}\\ &\text{institutional ownership, quarter and industry F.E.}).\end{aligned} \tag{2}$$

We use (2) to estimate "benchmark-adjusted" SEO announcement probabilities. For each firm-quarter observation in the sample, we set the benchmark SEO announcement probability as the predicted value from (2). We then replicate the 5×5 return-demand sort (i.e., as in Panels B and C of Table 2) by subtracting the average benchmark SEO announcement probability in each return-demand group from the realized SEO announcement probability. This alternative way of introducing the control variables allows for more direct comparisons to Table 2.

[16] Institutional demand is measured via quintile dummies in order to facilitate comparisons with Table 2.

[17] Marginal effects of interaction terms are calculated using the procedure described in Ai and Norton (2003), which takes into account the non-linearity of the Probit specification.

Table 3
Probability of SEO announcements: multivariate analysis.

The table presents multivariate analyses of SEO announcement probabilities. Panel A reports marginal effects from multivariate Probit regressions of SEO announcements. Specifications (1), (2), and (4) include previous quarter's characteristic-adjusted stock return, institutional demand variables and their return interactions, control variables, and quarter and industry fixed effects. Specification (3) includes control variables and quarter and industry fixed effects only. The dependent variable is an SEO announcement in Specifications (1) through (3), and an SEO announcement followed by an issuance within 60 trading days in Specification (4). Institutional demand is measured by *new holdings* in Specifications (1) and (4) and by *lagged new holdings* in the Specification (2). *High institutional demand* (*medium institutional demand*) is a dummy variable that takes the value of one if the relevant institutional demand variable is in its highest quintile (middle three quintiles). Panels B and C report the residuals from the Specification (3) in Panel A (i.e., benchmark-adjusted probabilities) in bivariate return-institutional demand sorts. At the beginning of each quarter, firms are independently sorted into five groups based on previous quarter's characteristic-adjusted stock return and institutional demand. The reported probabilities are calculated as time-series averages of quarterly average residual SEO announcement probability in each return-institutional demand group. Institutional demand is measured by *new holdings* in Panel B and *lagged new holdings* in Panel C. Marginal effects in Panel A and probabilities in Panels B and C are reported in percentage terms. Our sample of potential SEO announcers consists of 169,141 firm-quarter observations from 1985:1 to 2005:4. The *Z*-scores and *t*-stats are reported in parentheses.

Panel A: Probit regressions with quarter and industry fixed effects

	(1) *New holdings Announcement*		(2) *Lagged new holdings Announcement*		(3) *Controls only Announcement*		(4) *New holdings Issuance*	
Stock return (*previous quarter*)	1.65	(7.58)	1.40	(10.98)			1.23	(7.37)
High inst. demand	1.68	(10.78)	1.15	(8.62)			1.24	(9.37)
High inst. demand × *Stock return*	1.38	(4.85)	2.36	(8.06)			1.12	(4.83)
Medium inst. demand	0.45	(6.91)	0.36	(5.69)			0.26	(5.09)
Medium inst. demand ×*Stock return*	0.90	(3.87)	0.71	(4.39)			0.63	(3.36)
Lagged six-month stock return	0.67	(12.77)	0.68	(12.79)	0.86	(13.45)	0.46	(11.72)
M/B	0.01	(1.36)	0.00	(0.39)	0.02	(4.41)	0.00	(1.35)
Firm size	0.06	(2.88)	0.06	(2.83)	0.06	(2.12)	0.01	(0.62)
Firm age	−0.33	(−9.93)	−0.35	(−10.15)	−0.43	(−11.07)	−0.26	(−10.14)
IPO dummy	0.40	(3.97)	0.40	(3.87)	0.50	(4.18)	0.21	(2.95)
Profitability	−0.39	(−2.70)	−0.41	(−2.72)	−0.18	(−0.97)	−0.22	(−2.40)
Investment	0.58	(1.89)	0.63	(1.97)	0.51	(1.36)	0.36	(1.59)
R&D	0.54	(2.15)	0.62	(2.37)	1.04	(3.44)	0.30	(1.60)
Leverage	0.70	(7.14)	0.76	(7.38)	0.95	(8.31)	0.49	(6.55)
Volatility	−1.50	(−7.32)	−1.59	(−7.40)	−1.05	(−4.54)	−1.28	(−7.79)
Turnover	−0.07	(−0.44)	−0.07	(−0.44)	0.10	(0.60)	−0.03	(−0.23)
Institutional ownership	0.16	(1.48)	0.09	(0.82)	0.10	(0.65)	0.22	(2.55)
N	169,141		169,141		169,141		169,141	
Pseudo R-square	0.1270		0.1230		0.0835		0.1461	

Panel B: Bivariate sort of benchmark-adjusted SEO announcement probability on stock return and new holdings

	Return quintile					High minus low	
	Low	2	3	4	High		
Low institutional demand	−1.13	−0.77	−0.76	−0.44	0.15	1.28	(4.70)
2	−1.09	−0.70	−0.45	−0.28	0.12	1.21	(4.00)
3	−1.04	−0.65	−0.21	0.03	0.44	1.48	(7.07)
4	−1.28	−0.45	−0.09	0.38	0.91	2.20	(6.63)
High institutional demand	−1.07	−0.18	0.33	1.74	3.24	4.32	(10.41)
High minus low	0.06	0.58	1.09	2.18	3.09		
	(0.32)	(2.74)	(3.76)	(8.34)	(8.04)		

Panel C: Bivariate sort of benchmark-adjusted SEO announcement probability on stock return and lagged new holdings

	Return quintile					High minus low	
	Low	2	3	4	High		
Low institutional demand	−1.10	−0.77	−0.79	−0.30	0.42	1.52	(4.99)
2	−1.02	−0.76	−0.34	−0.25	0.71	1.74	(8.47)
3	−1.11	−0.51	−0.45	−0.04	0.89	2.00	(6.30)
4	−1.19	−0.68	−0.31	0.64	1.76	2.95	(10.32)
High institutional demand	−1.16	−0.17	0.65	1.74	3.89	5.05	(9.99)
High minus low	−0.06	0.60	1.44	2.04	3.47		
	(−0.45)	(3.25)	(5.41)	(8.31)	(9.14)		

The results are reported in Panels B and C of Table 3. The main takeaway from the analysis so far—that *new holdings* and its lagged value have strong interaction effects with the stock return on the issuance decision—is robust to the benchmark adjustment. As before, the announcement probability is much higher in the highest return-highest demand group relative to other return-demand groups. Importantly, since the probabilities in Panels B and C of Table 3 are benchmark-adjusted, they can be evaluated based on their absolute values as well and not just relative to each other. In this regard, notice that high stock returns positively affect the issuance decision only when institutional demand is also high. Firms with high returns but low *new holdings* are, in fact, only slightly more likely to issue relative to their benchmark issuance probabilities.

The dependent variable of interest in this section is the likelihood of an SEO announcement. Some of the subsequent analyses in the paper focus on the sample of completed offers. As a reference for these subsequent parts and for completeness, we replicate the SEO likelihood regressions of this section based on completed (i.e., not just announced) offers. Specifically, we estimate the Probit regression (1) for SEO announcements that are followed by an offer within 60 trading days. The results of this estimation, reported in the last column on Panel A of Table 3, are quantitatively similar to those in the first column.

We conduct a number of additional robustness tests. For brevity, we provide a summary discussion of these tests without tabulating the results:

- We extend the analysis to the debt-equity choice. Specifically, we focus on the sample of capital-raising firms, defined as those whose external financing over the next two (alternatively four) quarters exceeds 5% (alternatively 10%) of book assets, and analyze the share of equity capital in total capital raised. The own and interaction effects of *new holdings* and its lagged value discussed above continue to be strong in these tests as well.
- One may be concerned about reverse causality in interpreting the finding that *new holdings* in quarters t or $t-1$ predict the SEO announcement in quarter $t+1$. In particular, the increase in *new holdings* may result from prior marketing efforts by the issuers' investment banks, such as increasing analyst coverage and providing the research results to institutional clients. We perform two additional tests to address these concerns. First, we replicate the analysis using further lagged values of *new holdings*—specifically, quarter $t-2$. It is unlikely that the marketing of the SEO starts several quarters before its announcement. Second, we restrict the sample to firms that are in the top 25% in terms of the number of institutional shareholders. Increased analyst coverage is less likely to generate additional institutional demand for stocks of such firms, as they are already widely held and presumably quite well-known by institutional investors.[18] The results of both tests closely parallel those in Tables 2 and 3.
- *New holdings* may mechanically increase due to events such as acquisitions, which tend to be followed by equity issues. To avoid this potential spurious effect, we alternatively construct the sample by excluding firm-quarters in which the firm is an acquirer. This alternative sample provides almost identical results to those reported.

[18] The mean and median numbers of institutional shareholders are 85 and 47 in our main sample. The corresponding numbers in the top-25% sample are 217 and 170.

4.2. Alternative hypotheses

The previous section shows that seasoned equity issues follow periods in which both the stock return and institutional investor demand are high. This is consistent with our hypothesis that issuers attempt to time stock price increases that are supported by strong institutional demand. In this section, we discuss potential alternative explanations that may also account for the patterns observed in the data, and provide further tests to distinguish among competing hypotheses.

The main alternative explanation is that the institutional demand-issuance relationship is spurious and results from institutional demand being correlated with firms' financing needs. Clearly, one of the primary reasons for issuing equity is to finance investment. This does not necessarily conflict with our hypotheses about the relevance of institutional demand; firms with good investment opportunities may nevertheless wish to time their equity issues correctly to minimize negative price impact. However, it is possible that *proprietary information* about investment opportunities drives both the issuance decision and institutional demand. Specifically, some firms may have profitable investment opportunities that are not known by the public prior to their SEO filing, but uncovered by some institutional investors through research. Upon obtaining such information, these institutions are likely to add the firm's stock to their portfolios, with the hope of making profits once the news become public. It may thus appear that institutional demand predicts SEO announcements, whereas both the firm's decision to issue equity and increased institutional demand are, in fact, caused by improved investment opportunities that are not publicly known yet.

A direct test of this alternative hypothesis is difficult since we do not observe proprietary information about firms' investment plans. However, there are a number of tests that can help to shed light on the question of whether the institutional demand effect is spurious.

First, we examine firms' capital expenditures in relation to institutional demand. This is similar to the SEO announcement analysis of the previous section, except that the variable of interest here is the change in firms' investment rates. Specifically, we first calculate quarterly and annual changes in the investment rate, defined as capital expenditures over assets. The change variables are intended to capture the surprise component of investment outcomes that may not be publicly known in advance. We then calculate averages of these change variables for groups of firms in univariate sorts based on *new holdings*, and bivariate sorts based on *new holdings* and the stock return. The investment rate changes we consider are for one quarter and annual up to three years

following the sorting quarter. The results, reported in Panels A.1 through A.4 of Table 4, show that there is very little evidence of a positive relationship between institutional demand and subsequent changes in capital expenditures. In the quarterly analysis, change in investment rate exhibits small and insignificant differences across different institutional demand groups. At annual frequency and especially at longer horizons, these differences are generally significant but negative, indicating that high-institutional demand firms in fact reduce investment more relative to low-institutional demand firms. The long-horizon patterns are consistent with slowing down of investment rates, which is to be expected for firms that initially invest at relatively high

Table 4
Changes in capital expenditures and debt outstanding.

The table reports changes in capital expenditures and debt outstanding as functions of previous quarter's characteristic-adjusted stock return and institutional demand. At the beginning of each quarter, firms are independently sorted into five groups based on previous quarter's stock return and institutional demand measured by *new holdings*. Panel A reports quarterly and annual changes in capital expenditures following the sorting quarter. Capital expenditures are measured as a fraction of total assets. The reported changes in capital expenditures are calculated as time-series averages of quarterly averages and reported in percentage terms. Year t denotes the year that ends with the quarter in which the stock return and institutional demand are measured. Panel B reports the probability of an increase in debt outstanding of more than 5% of assets over the subsequent quarter or year following the sorting quarter. Probability of debt increase is calculated as time-series averages of quarterly probabilities and reported in percentage terms. In each panel we report averages from univariate sorts on *new holdings* and bivariate sorts on *new holdings* and stock returns. Our sample consists of 169,141 firm-quarter observations from 1985:1 to 2005:4. The t-statistics reported in parentheses are adjusted using Newey-West correction for heteroskedasticity and serial correlation.

Panel A: Change in capital expenditures—univariate and bivariate sorts

			Return quintile						
		Univariate	Low	2	3	4	High	High minus low	
A.1:	Quarterly capital expenditures								
	Low institutional demand	−0.06	−0.10	−0.12	−0.04	0.05	−0.02	0.08	(1.47)
	2	−0.03	−0.09	−0.05	−0.01	−0.04	0.06	0.15	(2.06)
	3	−0.05	−0.14	−0.09	−0.05	0.03	−0.01	0.13	(2.15)
	4	0.00	0.01	−0.10	0.02	0.08	0.01	0.01	(0.06)
	High institutional demand	−0.05	−0.10	−0.13	−0.18	−0.02	0.01	0.11	(1.61)
	High minus low	**0.01**	**0.00**	**−0.01**	**−0.14**	**−0.07**	**0.03**		
		(0.41)	(0.05)	(−0.10)	(−1.93)	(−1.38)	(0.67)		
A.2:	*Annual capital expenditures: Year t+1 minus year t*								
	Low institutional demand	−0.72	−1.47	−0.58	−0.70	−0.20	−0.11	1.36	(5.14)
	2	−0.81	−1.63	−0.99	−0.60	−0.42	−0.15	1.48	(6.08)
	3	−0.91	−2.15	−1.03	−0.63	−0.36	−0.22	1.93	(7.14)
	4	−0.94	−2.34	−1.22	−0.68	−0.36	−0.34	2.00	(6.78)
	High institutional demand	−0.90	−2.69	−1.78	−1.28	−0.72	−0.07	2.63	(9.33)
	High minus low	**−0.18**	**−1.22**	**−1.19**	**−0.58**	**−0.52**	**0.04**		
		(−1.30)	(−4.20)	(−3.31)	(−2.30)	(−2.54)	(0.15)		
A.3:	*Annual capital expenditures: Year t+2 minus year t+1*								
	Low institutional demand	−0.30	−0.27	−0.60	−0.15	−0.19	−0.28	−0.01	(−0.06)
	2	−0.37	−0.23	−0.49	−0.38	−0.30	−0.33	−0.10	(−0.57)
	3	−0.49	−0.49	−0.51	−0.54	−0.46	−0.45	0.04	(0.32)
	4	−0.71	−0.82	−0.71	−0.54	−0.66	−0.78	0.03	(0.20)
	High institutional demand	−1.04	−0.72	−0.89	−0.94	−0.94	−1.25	−0.53	(−3.07)
	High minus low	**−0.75**	**−0.45**	**−0.29**	**−0.79**	**−0.74**	**−0.97**		
		(−4.19)	(−1.96)	(−0.76)	(−3.75)	(−3.84)	(−3.05)		
A.4:	*Annual capital expenditures: Year t+3 minus year t+2*								
	Low institutional demand	−0.15	0.12	−0.10	−0.28	−0.31	−0.28	−0.40	(−1.69)
	2	−0.28	−0.01	−0.10	−0.26	−0.58	−0.69	−0.68	(−3.84)
	3	−0.28	0.07	−0.29	−0.30	−0.39	−0.39	−0.46	(−1.24)
	4	−0.55	−0.31	−0.46	−0.62	−0.63	−0.70	−0.39	(−2.30)
	High institutional demand	−0.82	−0.51	−0.57	−0.80	−0.82	−1.00	−0.48	(−2.66)
	High minus low	**−0.67**	**−0.63**	**−0.48**	**−0.52**	**−0.51**	**−0.71**		
		(−3.66)	(−3.07)	(−2.36)	(−2.75)	(−3.01)	(−2.67)		

Table 4 (*continued*)

Panel B: Probability (increase in debt outstanding > 5% assets)—univariate and bivariate sorts

			Return quintile						
		Univariate	Low	2	3	4	High	High minus low	
B.1:	*Quarterly debt outstanding increase*								
	Low institutional demand	7.81	8.07	7.43	7.65	7.40	9.10	1.03	(1.24)
	2	8.22	8.46	8.03	8.18	8.30	8.02	−0.44	(−0.68)
	3	8.74	9.12	9.02	8.67	8.45	8.29	−0.83	(−1.19)
	4	9.63	9.36	10.10	9.80	9.59	9.56	0.20	(0.51)
	High institutional demand	9.87	9.95	10.33	9.93	10.19	9.74	−0.21	(−0.27)
	High minus low	2.07	1.88	2.90	2.28	2.80	0.64		
		(6.94)	(2.07)	(4.67)	(4.15)	(5.87)	(0.88)		
B.2:	*B.2: Annual debt outstanding increase*								
	Low institutional demand	19.21	16.34	19.67	20.91	20.57	19.52	3.18	(3.31)
	2	20.75	18.17	21.40	21.51	22.12	19.93	1.76	(1.49)
	3	21.36	19.61	21.83	21.64	22.86	20.33	0.72	(0.86)
	4	22.60	20.72	22.96	23.39	23.01	23.07	2.35	(3.38)
	High institutional demand	22.80	20.65	23.64	23.96	24.42	22.17	1.51	(1.81)
	High minus low	3.59	4.31	3.97	3.05	3.85	2.64		
		(8.45)	(5.20)	(5.02)	(3.55)	(4.74)	(2.72)		

rates. More relevant for our purposes is the lack of any evidence that high institutional demand-high return episodes are followed by exceptionally good investment prospects. It appears that spikes in institutional demand do not coincide with positive investment surprises either in the short or the long run.

Second, we examine changes in debt outstanding in relation to institutional demand. Firms with investment opportunities are likely to issue debt as well as equity to finance those investments. If our findings about the predictive role of institutional demand for equity issues are indeed driven by good investment opportunities, one would expect to observe a similar pattern with respect to net debt issues (i.e., change in debt outstanding). Panels B.1 and B.2 of Table 4 report the probability of "large" increases in debt outstanding, defined as those that exceed 5% of assets, within one quarter and one year after the observation of *new holdings*, respectively. While the probability of an increase in debt outstanding is higher for high-institutional demand firms than for low-institutional demand firms, the differences are small. Furthermore, the strong non-linear and interaction effects of demand and return that we observe for SEOs are not present for debt increases. In fact, in either panel it is not the high institutional demand-high return group that exhibits the highest debt increase probability. Firms in this group do not seem to raise capital through debt issues any more than firms in most other groups.

Third, we analyze the likelihood of SEOs that are motivated by reasons other than financing investment. We identify these SEOs in two alternative ways. First, most SEO filings in our sample (about 83%) include information about the primary purpose of the offer proceeds. We divide these purposes into the following categories: investment, general corporate purposes, acquisition, capital structure, shareholder use, other. Among these, capital structure (e.g., debt repayment) and shareholder use (e.g., financing dividends, sale of secondary shares) clearly indicate purposes other than financing investment. In Panel A of Table 5, we report the probability of SEO announcements that include either one of these two types of stated purposes (and none other).[19] Not surprisingly the probabilities are smaller in magnitude relative to the main analysis, since announcements with one of the two stated purposes constitute a strict subset of all announcements (855 out of 2,614, or about 33%). Of more relevance are relative magnitudes, which replicate the patterns observed for the overall announcement sample. Relative to other demand-return groups, high institutional demand-high return firms are substantially more likely to announce offers with stated purposes of capital structure or shareholder use.

Our second approach to detect SEOs for non-investment purposes is to look for the presence of secondary shares, which are shares sold by existing shareholders as part of the offer. Offers with a substantial fraction of secondary shares constitute a useful laboratory in two respects. First, investment prospects and financing needs of the issuer are less relevant for these offers since the proceeds largely accrue to selling shareholders, not to the firm. Second, the informational frictions and adverse selection concerns that motivate our hypotheses are likely to be more severe in the case of offers with secondary shares. The exit of existing shareholders through an SEO is potentially a more negative signal about firm value than, say, demanding capital for investment purposes. Therefore, the certification role played by institutional demand may be even more important in the case of offers that facilitate shareholder exit. In Panel B of Table 5, we report the likelihood of SEO

[19] The results are qualitatively the same when announcement probabilities are calculated separately for the two stated purpose categories of interest.

Table 5
Probability of SEO announcements: non-investment purposes.

The table reports quarterly SEO announcement probabilities as functions of previous quarter's characteristic-adjusted stock return and institutional demand. At the beginning of each quarter, firms are independently sorted into five groups based on previous quarter's stock return and institutional demand measured by *new holdings*. In each panel, we estimate the probability of SEO announcements that are unlikely to be driven by investment purposes: those with stated purposes that are related to "shareholder use" or "capital restructuring" in Panel A, and those followed by offers that comprise more than 50% secondary shares in Panel B. Announcement probabilities are calculated as time-series averages of quarterly probabilities and reported in percentage terms. Our sample of potential SEO announcers consists of 169,141 firm-quarter observations from 1985:1 to 2005:4. The *t*-statistics reported in parentheses are adjusted using Newey-West correction for heteroskedasticity and serial correlation.

Panel A: Stated purposes related to "shareholder use" or "capital restructuring"

	Return quintile						
	Low	2	3	4	High	High minus low	
Low institutional demand	0.08	0.24	0.26	0.33	0.57	0.50	(2.88)
2	0.16	0.29	0.32	0.28	0.62	0.46	(2.74)
3	0.20	0.35	0.36	0.74	0.81	0.62	(3.90)
4	0.11	0.48	0.46	0.74	0.87	0.76	(4.10)
High institutional demand	0.35	0.25	0.74	1.34	1.66	1.31	(6.00)
High minus low	0.27	0.01	0.48	1.00	1.09		
	(2.46)	(0.14)	(2.82)	(5.54)	(5.18)		

Panel B: High fraction of secondary shares

	Return quintile						
	Low	2	3	4	High	High minus low	
Low institutional demand	0.07	0.09	0.18	0.23	0.31	0.24	(2.01)
2	0.08	0.16	0.25	0.24	0.41	0.33	(2.17)
3	0.12	0.31	0.27	0.44	0.38	0.27	(2.84)
4	0.09	0.22	0.42	0.55	0.51	0.42	(3.65)
High institutional demand	0.15	0.28	0.58	0.87	1.03	0.87	(7.25)
High minus low	0.08	0.19	0.40	0.64	0.71		
	(0.99)	(1.94)	(2.26)	(5.94)	(5.23)		

announcements that are followed by offers in which at least 50% of the shares sold are secondary. Similar to our main finding, we see that such offers are most likely following periods of high stock returns combined with high institutional demand as measured by *new holdings*.

Finally, we analyze subsamples of firms which are unlikely to need equity capital to finance investment, either because they have other financing means or because they return (rather than raise) capital on the net. Specifically, we consider the following subsamples: (i) dividend payers, (ii) firms with low leverage (defined as book debt being less than 10% of assets), (iii) firms with negative external financing (i.e., free cash flow exceeds capital expenditures). Subsamples (i) and (ii) are firms that can reduce dividend payout or issue debt to finance their investments, and subsample (iii) are firms that self-finance due to high free cash flow. The results, reported in Panels A through C of Table 6, are quantitatively similar to those from the full sample.

In summary, two points emerge from the above analyses. First, high institutional demand-high return firms do not invest substantially more or resort to more debt financing relative to other groups of firms. Second, the main patterns of institutional demand-issuance relationship also obtain for types of offers that are unlikely to be triggered by financing needs (e.g., those with a high fraction of secondary shares), and types of firms that are unlikely to need equity capital (e.g., those with negative external financing). Taken together, these results seem to indicate a genuine demand effect on the issuance decision that is not entirely driven by investment opportunities.

Another alternative explanation for our findings is based on the idea that demand curves for stocks are downward sloping. In a market with differences of opinion and impediments to arbitrage such as short-selling constraints, stock prices may be governed by supply and demand (Miller, 1977; Chen, Hong, and Stein 2002). In equilibrium, each stock is held by the most optimistic investors, and the pessimists are sidelined. An equity issue (i.e., an increase in supply) lowers the stock price down to the point at which demand from previously sidelined investors absorbs the newly issued shares. It is reasonable to argue that, for a variety of reasons, managers are averse to engaging in actions that substantially push down their firms' stock prices. Accordingly, one may expect equity issues to occur in periods in which demand curves for issuers' stocks flatten or shift outward. In other words, firms may view episodes of improving investor opinions as providing an opportunity to issue stock with minimal price impact.[20]

[20] Notice that this explanation differs from our main thesis in that the negative price impact of an equity issue is due to increased supply, not adverse selection.

Table 6
Probability of SEO announcements: Subsample analyses.

The table reports quarterly SEO announcement probabilities as functions of previous quarter's characteristic-adjusted stock return and institutional demand. At the beginning of each quarter, firms are independently sorted into five groups based on previous quarter's stock return and institutional demand as measured by *new holdings*. In Panels A through C, we limit the sample to firms that are likely to have other means of financing their investment: firms paying cash dividends in Panel A, firms with relatively low debt (i.e., with book leverage less than 10%) in Panel B, and firms with free cash flow higher than capital expenditures (i.e., with negative external financing) in Panel C. In Panel D, we examine the subsample of firms with highly liquid stocks, defined as those that are in the top third of the distribution of turnover and the bottom third of the distribution of Amihud (2002) price-impact measure. Both turnover and Amihud measure are calculated as averages over the four quarters prior to the beginning of the return-institutional demand sorting quarter. Announcement probabilities are calculated as time-series averages of quarterly probabilities and reported in percentage terms. Out of our full sample of potential SEO announcers (169,141 firm-quarter observations from 1985:1 to 2005:4), each subsample contains: 79,968 (dividend payers), 62,922 (low debt), 103,793 (negative external financing), and 37,135 (highly liquid stocks) firm-quarter observations. The *t*-statistics reported in parentheses are adjusted using Newey-West correction for heteroskedasticity and serial correlation.

Panel A: Dividend payers

	Return quintile						
	Low	2	3	4	High	High minus low	
Low institutional demand	0.32	0.28	0.21	0.61	1.04	0.72	(2.06)
2	0.47	0.47	0.73	0.69	1.31	0.84	(2.18)
3	0.40	0.51	0.72	0.91	1.76	1.36	(4.48)
4	0.30	0.95	0.76	1.68	1.86	1.55	(4.52)
High institutional demand	0.76	1.54	1.65	3.65	3.67	2.91	(4.91)
High minus low	0.44	1.25	1.44	3.04	2.63		
	(1.22)	(1.82)	(3.33)	(7.38)	(5.83)		

Panel B: Low debt

	Return quintile						
	Low	2	3	4	High	High minus low	
Low institutional demand	0.24	0.31	0.26	0.64	0.96	0.72	(2.01)
2	0.18	0.42	0.48	0.77	1.50	1.33	(2.86)
3	0.54	0.62	0.74	0.82	1.39	0.85	(2.91)
4	0.35	1.06	1.47	1.45	2.39	2.04	(4.56)
High institutional demand	0.70	1.68	1.89	2.66	4.15	3.45	(8.21)
High minus low	0.46	1.37	1.63	2.01	3.19		
	(1.78)	(3.83)	(3.84)	(3.91)	(6.67)		

Panel C: Negative external financing

	Return quintile						
	Low	2	3	4	High	High minus low	
Low institutional demand	0.15	0.42	0.26	0.70	0.92	0.77	(3.14)
2	0.24	0.49	0.59	0.86	1.46	1.21	(3.58)
3	0.34	0.58	0.80	1.16	1.89	1.55	(5.05)
4	0.26	0.95	1.25	1.59	2.01	1.75	(5.52)
High institutional demand	0.59	1.33	1.78	3.07	4.56	3.97	(9.66)
High minus low	0.44	0.91	1.52	2.38	3.64		
	(1.85)	(3.02)	(4.78)	(7.68)	(8.61)		

Panel D: Highly liquid stocks

	Return quintile						
	Low	2	3	4	High	High minus low	
Low institutional demand	0.44	0.55	0.05	1.42	1.85	1.41	(0.79)
2	0.29	0.96	0.60	1.48	1.64	1.35	(2.20)
3	0.73	0.83	1.08	1.35	1.60	0.87	(1.59)
4	0.49	1.45	1.63	1.72	2.67	2.18	(4.89)
High institutional demand	0.89	1.16	2.57	2.99	4.57	3.67	(8.95)
High minus low	0.45	0.61	2.52	1.56	2.72		
	(1.28)	(1.30)	(4.15)	(1.53)	(4.58)		

It is not immediately obvious that the presence of downward-sloping demand curves explains our findings. As Chen, Hong, and Stein (2002) point out, the differences-of-opinion argument concerns all types of investors, not just institutions. While it is conceivable that changes in institutions' opinions cause demand curve shifts, it is equally, if not more, plausible that these shifts result from changes in retail investors' opinions. Nevertheless, we attempt to evaluate the demand curve explanation empirically. Specifically, we focus on the subsample of firms with highly liquid stocks, defined as those that have high turnover and low Amihud (2002) price-impact measure.[21] Since the markets for these stocks are quite deep (i.e., heavy trading with low price impact), their demand curves are unlikely to be steep. Absent adverse selection concerns, these firms should be able to find buyers for their newly issued shares at small discounts to their prevailing stock prices. The results, reported in Panel D of Table 6, show that *new holdings* continues to have a strong effect on the issuance decision for firms with highly liquid stocks as well. We conclude that the demand curve explanation is unlikely to fully account for our findings.

4.3. Additional analyses

In this section, we perform additional tests that are designed to shed more light on the relevance of institutional investor demand for equity issues. Specifically, we explore the nature of information that institutional demand reflects, the channels through which such information may reach issuers, and some further aspects of the issuance decision.

The results so far show that SEO announcements are most likely following periods in which both the stock return and *new holdings* are unusually high (the corner cell in the 5×5 sorts). What causes the spike in institutional demand in such periods? One possibility is that the increase is at least in part due to purchases by well-informed institutions, as we hypothesize. Another possibility is that we are simply picking up institutions' response to same-quarter high stock returns. Perhaps institutions sometimes herd into purchasing the same stocks, and are more likely to do so for stocks with high recent returns (e.g., due to positive-feedback trading).

The size of institutions' purchases may help distinguish between informed trading and herding. If institutions simply respond to high returns by purchasing the stock en masse, one might expect most of these purchases to be small relative to shares outstanding. On the other hand, institutional trades that convey information and move the stock price are likely to be (or perhaps have to be) large. Accordingly, we compare the frequencies of small versus large purchases across different return-demand groups analyzed in Table 2. Since we are primarily interested in the effect of *new holdings*, the purchases in question are holding initiations by institutions. Specifically, we define a holding initiation to be large (small) if the number of shares purchased divided by the number of shares outstanding is in the top (bottom) 25% of the distribution of the same variable across all comparable holding initiations. The set of comparable holding initiations is defined as those that take place in the same quarter for firms that are in the same size decile as the firm in question.

Table 7 reports the results. The numbers reported in Panel A are the average values of *new holdings* in each return-demand group. Notice that there is a substantial spike in the highest return-highest demand group: 36.63 holding initiations per 100 existing institutional shareholders. We are interested in whether this spike represents informed trading or herding. In Panel B, we report the average shares of large and small holding initiations within each return-demand group. If the size of initiations were random, one would expect large and small initiations to each account for 25% of the numbers reported in Panel A. We find that this is not the case. Consider the highest return quintile, which is of most interest. When demand is low, more of that demand comes in the form of small initiations than large (27.25% versus 22.03%). This picture is reversed as demand increases. Of the 36.63 initiations per 100 holders in the highest return-highest demand group, on average 29.43% are large initiations, whereas only 19.58% are small initiations. While not conclusive, the evidence is in line with the hypothesis that high institutional demand-high return periods exhibit an increased frequency of large informed trades. There is no evidence that a wave of small purchases dominates these periods.

We find that equity issues are highly sensitive to *new holdings* but not sensitive at all to *change in existing holdings* or *terminated holdings*. What accounts for this stark difference? One explanation is that *new holdings* is a less noisy indicator of the valuation-relevant information institutional investors possess. Changes in existing holdings, including terminations, may be driven to a greater extent by fund flows and diversification considerations. The fact that *change in existing holdings* and *terminated holdings* exhibit almost zero correlation with the contemporaneous stock return (Panel D of Table 1) is consistent with this view. A second explanation is that issuers can better predict institutional participation in the offer based on *new holdings*. Purchases by existing institutional shareholders tend to be fewer and smaller in size relative to new holdings. Persuading existing holders to absorb a substantial amount of the newly issued shares may thus require large price concessions (e.g., as compensation for holding less-diversified portfolios). Accordingly, potential issuers may be primarily concerned about attracting non-shareholder institutions to the offer and track *new holdings* as a gauge in this regard.

How do potential issuers track *new holdings*? The data on quarter-end institutional holdings become publicly available with a relatively short lag of 45 days, but firms that are trying to favorably time their equity issues are likely to seek advance and more timely indicators of institutional demand. Anecdotal evidence suggests that firms do so by enlisting the help of their investment bankers, who may have access to privileged information through the bank's other businesses

[21] In each quarter, stocks are ranked independently based on turnover and Amihud price-impact measure. Both variables are calculated as averages over the past four quarters. The sample of firms with highly liquid stocks is then defined as those whose stocks are in the top third of the distribution of turnover and the bottom third of the distribution of Amihud measure. This sample constitutes 9.52% of the main sample.

Table 7
Large versus small holding initiations.

The table reports the shares of large and small holding initiations in *new holdings*. At the beginning of each quarter, firms are independently sorted into five groups based on previous quarter's stock return and *new holdings*. Panel A reports the average value of *new holdings* in each return-institutional demand group. Panel B reports in percentage terms the average shares of large and small holding initiations among *new holdings* in each return-institutional demand group. Large (small) holding initiations are defined as those that are in the top (bottom) 25% of the distribution of all holding initiations for all stocks within a size decile in each quarter. Our sample consists of 169,141 firm-quarter observations from 1985:1 to 2005:4.

Panel A: Average values of new holdings

	Return quintile				
	Low	2	3	4	High
Low institutional demand	3.06	3.43	3.58	3.49	3.09
2	8.28	8.24	8.23	8.30	8.38
3	12.08	12.04	12.01	12.06	12.22
4	17.18	17.10	17.14	17.20	17.51
High institutional demand	29.24	29.57	29.87	30.89	36.63

Panel B.1: Share of large holding initiations

	Return quintile				
	Low	2	3	4	High
Low institutional demand	21.69%	21.22%	20.27%	20.19%	22.03%
2	21.59%	20.69%	21.46%	21.09%	21.01%
3	22.89%	22.34%	22.26%	22.55%	22.75%
4	25.47%	23.52%	23.98%	24.04%	24.72%
High institutional demand	27.34%	26.40%	26.31%	27.11%	29.43%

Panel B.2: Share of small holding initiations

	Return quintile				
	Low	2	3	4	High
Low institutional demand	27.50%	26.70%	27.73%	29.61%	27.25%
2	26.86%	25.25%	25.36%	26.80%	27.60%
3	25.01%	24.08%	23.88%	24.14%	25.14%
4	23.62%	23.71%	22.57%	22.81%	23.53%
High institutional demand	22.28%	21.40%	21.40%	20.36%	19.58%

(e.g., brokerage and trading services).[22] Indeed, one of the key functions investment banks perform for their equity issuing clients appears to be providing advice on the timing of the issue based on likely market conditions.

To test for the presence and relevance of this investment bank channel, we examine the issuance behavior of firms that are past clients of investment banks with prime brokerage services. Prime brokers, by their participation in trading activity and due to relationships with institutional investors, are in a good position to have substantial privileged information about pending institutional demand. To see if such information finds its way to the bank's corporate clients, we utilize the following empirical design. Consider a firm that has worked with Bank A for executing its equity issues in the past. Bank A, in turn, provides brokerage services to some, but not all, institutional investors. Furthermore, there are other banks, say, Bank B, which are prime brokers of yet other institutional investors; however, the firm in question does not work with Bank B. If the investment bank channel discussed above operates as hypothesized, then one would expect the firm's equity issuance decision to respond more strongly to demand from Bank A's institutional clients than to demand from Bank B's institutional clients.

To operationalize this design, we need to identify firm-bank and bank-institutional investor relationships. We identify firm-bank relationships based on the firm's most recent equity issue. Specifically, we take the sample of firms whose most recent equity issue was underwritten by an investment bank with prime brokerage services, and set that bank as the firm's relationship.[23] To identify bank-institution relationships, we make use of IPO allocations, which are known to be given to banks' favored institutional clients.[24] Specifically, for each bank we create a list of institutional clients, which includes all institutions that have

[22] Such information cannot legally be disclosed to bank's corporate clients, but preventing its partial leakage within the bank's internal organization and ultimately to corporate clients seems difficult, especially in light of the fact that banks compete to win corporate business.

[23] The prime broker sample consists of brokerage houses that appeared more than twice in the last five annual surveys of prime brokers conducted by *Global Custodian*, a trade magazine.

[24] See, for example, Reuter (2006), who finds a positive correlation between brokerage commissions paid by mutual funds to lead IPO underwriters and reported holdings of the IPOs that they underwrite.

received at least one allocation in the IPOs underwritten by the bank in the preceding three years.

Based on firm-bank and bank-institution relationships, we create two institutional demand measures for each firm, *client demand* and *non-client demand*. *Client demand* is the number of position initiations by institutions that are clients of the firm's relationship bank. *Non-client demand* is the number of position initiations by institutions that are not clients of the firm's relationship bank. Both demand measures are normalized by the number of institutional shareholders of the stock at the beginning of the quarter.[25] Table 8 reports our main bivariate sort for SEO announcement probabilities for each one of these measures. The institutional demand effect is clearly stronger in the case of *client demand* (Panel A) than *non-client demand* (Panel B). For example, while high versus low demand probability differences are highly significant in Panel A, several of these are insignificant or marginally significant in Panel B. The point estimates also reveal a stronger demand effect in the case of client institutions. The evidence is highly suggestive of an investment bank channel through which potential issuers obtain information about the institutional demand conditions for their stocks.

Finally, we analyze aspects of the issuance decision other than the SEO announcement itself. The results, discussed in turn below, are reported collectively in Table 9.

First, we consider the speed with which issuers respond to institutional demand. Panel A of Table 9 tabulates three metrics in this regard: (1) the timing of the SEO announcement, measured by the number of trading days from the beginning of the quarter in which the announcement takes place; (2) the fraction of announcements followed by an offer within 60 trading days; (3) the timing of the offer, measured by the number of trading days from announcement to offer. All three metrics indicate that high-institutional demand firms attempt to bring their offers to the market more quickly than low-institutional demand firms do. For example, the demand effect on the number of trading days until the announcement is −4.73, indicating that high-institutional demand firms tend to announce their SEOs about five trading days, or a week, earlier than low-institutional demand firms, on average. High-institutional demand firms also tend to proceed with an offer faster once the announcement is made: they are 4.30 percentage points more likely to issue within 60 trading days, and on average issue 2.46 days earlier (conditional on issuing within 60 trading days) than low-institutional demand firms do. The evidence suggests that issuers try to capitalize on the favorable conditions generated by high institutional demand quickly.

Second, we look at the size of offer proceeds. If firms regard high-institutional demand periods as providing an opportunity to issue equity at relatively better terms, one may expect to see not only more but also larger issues in these periods. The last two columns of Panel A of Table 9 shows that this is indeed the case. Offer proceeds scaled by book assets are substantially and significantly higher for issuers in the highest institutional demand group. Scaling proceeds by market capitalization somewhat dampens the institutional demand effect, since high-institutional demand firms tend to have relatively higher market-to-book ratios. Nevertheless, the institutional demand effect remains significantly positive when proceeds are measured relative to market capitalization as well.

Third, we analyze shelf registrations and offers. Shelf registrations facilitate expedited offers; a firm with an existing shelf registration can issue equity without the need to submit a new filing to the S.E.C. immediately before the offer. Our main SEO sample excludes shelves for the most part, as we require distinct announcement and offer days to allow for a clear timeline (offers from existing shelves are typically not announced in advance). However, institutional demand is likely to be relevant for shelf offers for the same reasons as non-shelf offers.

In Panel B of Table 9 we report several statistics regarding shelf registrations and offers. The first column reports the probability of registering a shelf, estimated quarterly for groups of firms sorted based on previous quarter's *new holdings*.[26] The results show that high-institutional demand firms are significantly more likely to register shelves than low-institutional demand firms. Next, we focus on firms that have a shelf registration in effect, identified as those that have registered for shelves within the past two years. For these firms, we estimate quarterly probabilities of shelf offers and traditional offers, again as functions of previous quarter's *new holdings*. The results, reported in the middle two columns, point to a significantly positive institutional demand effect.

Of more relevance for gauging the reaction of issuers to institutional demand is the *relative* likelihoods of shelf versus traditional offers. If, as we hypothesize, firms attempt to take advantage of favorable demand conditions quickly, one would expect to see an increase in the likelihood of shelf offers relative to traditional SEOs conditional on issuance. The last column in Panel B of Table 9 examines this question by computing the fraction of shelf offers among all offers by shelf registrants. The fractions reported here are based on the pooled sample, not time-series averages of quarterly proportions, as there are many quarters in our time series in which there are no offers of either kind by a shelf registrant within a given institutional demand group.[27] The reported fractions point to an increased frequency of shelf offers relative to traditional offers when institutional demand is high. The *p*-value of the highest-lowest demand difference exceeds conventional significance levels, but this is mainly due to the fact that there are very few observations in the lowest demand group. When low demand is alternatively defined as the combination of the bottom two *new holdings* groups, the *p*-value of its difference from

[25] Note that *client demand* and *non-client demand* sum up to our main demand measure *new holdings*.

[26] Results with bivariate demand-return sorts are similar to those reported.

[27] Specifically, out of the 84 quarters in our time series, the number of quarters in which a shelf registrant has an offer are 16, 25, 28, 31, and 42 for the five institutional demand groups (lowest to highest), respectively.

Table 8
Probability of SEO announcements: clients of prime brokers.

The table reports quarterly SEO announcement probabilities as a function of previous quarter's characteristic-adjusted stock return and institutional demand from the "clients" of prime brokers. The prime broker sample consists of brokerage houses that appeared more than twice in the last five annual surveys of prime brokers conducted by *Global Custodian* (a trade magazine). We limit our sample to firms whose last equity issuance was underwritten by one of the prime brokers in our sample. For each of these prime brokers, we create a list of institutional "clients" that include all institutions receiving allocations during IPOs underwritten by the prime broker in the preceding three years. Panel A reports the probability of SEO announcement as a function of underwriter *client demand*, which is calculated as *new holdings* initiated by the institutional clients of the firm's last underwriter. Panel B reports the probability of SEO announcement as a function of *non-client demand*, which is calculated as *new holdings* initiated by the institutional clients of other prime brokers. Announcement probabilities are calculated as time-series averages of quarterly probabilities and reported in percentage terms. The *t*-statistics reported in parentheses are adjusted using Newey-West correction for heteroskedasticity and serial correlation. Our sample of potential SEO announcers with previous affiliations with a prime broker consists of 54,724 firm-quarter observations from 1985:1 to 2005:4.

Panel A: Bivariate sort on stock return and client demand

	Return quintile					
	Low	2	3	4	High	High minus low
Low client demand	0.21	0.57	0.42	1.29	2.67	2.46
2	0.28	0.89	0.89	1.34	1.35	1.07
3	0.52	0.70	1.47	1.88	1.96	1.44
4	0.89	1.83	2.00	2.79	3.06	2.17
High client demand	0.85	1.30	2.64	3.88	5.48	4.64
High minus low	0.64	0.73	2.22	2.59	2.81	
	(2.57)	(1.63)	(4.21)	(4.79)	(3.66)	

Panel B: Bivariate sort on stock return and non-client demand

	Return quintile					
	Low	2	3	4	High	High minus low
Low non-client demand	0.61	1.08	1.03	2.08	3.22	2.61
2	0.33	1.01	1.17	1.70	2.02	1.69
3	0.75	1.18	1.69	2.33	2.53	1.78
4	0.47	1.25	1.41	1.73	3.72	3.26
High non-client demand	0.77	1.34	2.40	3.29	4.88	4.11
High minus low	0.16	0.25	1.37	1.22	1.65	
	(0.58)	(0.60)	(2.45)	(2.52)	(2.23)	

the highest demand group becomes a highly significant 0.0144 (not reported in Table 9). Overall, the results show that the strong effect of institutional demand carries over to shelf registrations and to both the absolute and relative likelihood of shelf offers as well.

5. Stock returns around and following equity issuance decision

5.1. Market reaction to the issuance decision

By announcing an SEO, a firm indicates its intention to issue equity. The offer itself typically takes place several weeks after the announcement (in our sample, the median number of trading days between the announcement and the offer is 21). At the time they announce their SEOs, firms are primarily concerned about the price at which they will issue the new shares. Accordingly, we now analyze stock price changes during the SEO registration period (i.e., the period between the announcement and the offer). In particular, we ask whether the stock return following an announcement is predicted by institutional investor demand prior to the announcement quarter.

The registration period varies in length across SEOs and can be quite long in some cases. We use two different approaches to deal with this problem. First, we analyze 60 trading-day post-announcement returns for all SEO announcements (i.e., including those that are not followed by an offer within 60 trading days). This approach provides a clear representation of the relationship between pre-announcement institutional investor demand on post-announcement returns. However, some of the observations correspond to delayed or withdrawn offers. As a second approach, we focus on SEOs that are completed within 60 trading days following the announcement. The 60-day cutoff alleviates the concern that the analysis is dominated by SEOs that stay in registration for extremely long periods.[28]

Panel A of Table 10 reports the results. Firms that announce SEOs are sorted into five demand groups based on their *new holdings* quintile assignment in the quarter prior to the announcement (i.e., as in Section 4.1). Since

[28] About 80% of announced SEOs are completed within 60 trading days. The choice of 60 trading days (about one quarter) is admittedly arbitrary; however, the results are robust to changing this threshold.

Table 9
Equity issuance decision: additional analyses.

The table reports analyses of the additional aspects of the SEO decision. Panel A reports the following average characteristics of SEO announcements for each pre-announcement quarter *new holdings* quintile: number of trading days to announcement from the beginning of announcement quarter, the fraction of announcements followed by an offer within 60 trading days, the number of trading days from announcement to issuance for the subsample of SEO announcers that issue within 60 trading days of announcing, and the size of proceeds (scaled by lagged book assets and by market capitalization) for the subsample of SEO announcers that end up issuing. The pooled *t*-statistics are reported in parentheses. Panel B reports the probabilities of shelf registrations and of shelf offers conditional on prior shelf registration as functions of institutional demand as measured by *new holdings*. For the subsample of firms with prior shelf registrations, we calculate the probability of shelf offering (i.e., offers designated as such by SDC or issued within one trading day of the SEC filing) and traditional offerings (the rest). The probabilities are calculated as time-series averages of quarterly probabilities and reported in percentage terms. The fraction in the last column of Panel B is reported over the whole sample, and the *p*-value for the difference calculated using binomial test is reported in parentheses. For all other differences, *t*-statistics adjusted using Newey-West correction for heteroskedasticity and serial correlation are reported in parentheses. The sample includes 2,614 SEO announcements in the period from 1985:1 to 2005:4.

Panel A: Characteristics of SEO announcements sorted on pre-announcement quarter new holdings

	N	*Number of trading days to announcement (from the beginning of announcement quarter)*	*Fraction of announcements followed by an offer within60 trading days*	*Number of trading days from announcement to issuance (conditional on issuing within60 trading days)*	*Size of proceeds (scaled by book assets)*	*Size of proceeds (scaled by market capitalization)*
Low inst. demand	126	35.22	78.48%	25.30	35.90%	27.13%
2	285	33.85	74.48%	25.16	29.91%	28.84%
3	392	34.60	71.05%	22.85	40.08%	27.89%
4	585	33.13	73.80%	23.45	54.30%	32.30%
High inst. demand	1,226	30.49	82.78%	22.84	66.71%	39.37%
High minus low		−4.73	4.30%	−2.46	30.81%	12.25%
		(3.02)	(1.25)	(2.34)	(3.98)	(2.54)

Panel B: Shelf registration and issuance as a function of pre-announcement quarter new holdings

		Conditional on shelf registration		
	Prob. of shelf registration	*Prob. of shelf offering*	*Prob. of traditional offering*	*Fraction of shelf offering*
Low inst. demand	0.55%	0.14%	1.10%	9.52%
2	0.73%	0.27%	1.64%	7.32%
3	0.81%	0.09%	1.21%	16.33%
4	1.08%	0.31%	1.92%	21.62%
High inst. demand	1.70%	1.23%	4.31%	22.30%
High minus low	1.16%	1.09%	3.22%	12.78%
	(3.17)	(2.54)	(2.62)	(p=0.18)

there are few SEOs with very low pre-announcement demand, Table 10 reports the results by combining the lowest three demand groups into one. In the first two columns, the sample includes all SEO announcements. The first column reports the SEO announcement effect, defined as the characteristic-adjusted stock return in the three trading-day window around the announcement. The second column reports the characteristic-adjusted stock return in the 60 trading days following the announcement. In the third column the sample is restricted to announcements that are followed by an offer within 60 trading days; this column reports the characteristic-adjusted stock return in the (+2, offer) window following the announcement.

As in previous studies, the initial market reaction to the issuance decision as measured by the three-day SEO announcement effect is negative, on average, in our sample. More importantly, this initial market reaction does not vary substantially or monotonically across announcements preceded by different levels of institutional investor demand. In contrast, stock returns following the announcement exhibit significant differences. Firms with low pre-announcement institutional demand perform close to their return benchmarks during the 60 trading days following the announcement. Firms with high pre-announcement institutional demand, however, beat their return benchmarks by 5.06%. Offers completed within 60 trading days of the announcement reveal a similar pattern. While the low-institutional demand announcers experience further negative returns, the high-institutional demand announcers exhibit positive returns, on average.

The analysis in Panel A of Table 10 is in event time. There is clearly substantial overlap of return estimation periods across SEO announcements, especially because announcements are clustered in time. To the extent that firms are subject to common risk factors that are not captured by size and book-to-market benchmark portfolios, statistical inference based on event-time analysis may

Table 10
Market reaction to the issuance decision.

The table reports the analysis of market reaction to SEO announcements. *Announcement effect* is the three-day characteristic-adjusted stock return around the announcement. *Announcement*(+2,+61) is the 60-day characteristic-adjusted stock return following the announcement for all announced SEOs. *Announcement*(+2,*offer*) is the characteristic-adjusted stock return from two days after the announcement to the day before the offer for announcements followed by an offer within 60 trading days. All return windows are measured in trading days. SEO firm-quarter observations are sorted into five demand groups based on their *new holdings* quintile assignment in the quarter prior to the SEO announcement. We combine the three lowest demand group into one, and report the two highest demand groups (4th and 5th quintiles) separately. Panel A reports the characteristic-adjusted stock returns as a function of *new holdings* in the quarter prior to the SEO announcement quarter. Panel B reports the time-series averages of quarterly-average *Announcement*(+2,+61) and *Announcement*(+2,*offer*) series for SEOs in the high and Low institutional demand groups. The *t*-statistics are reported in parentheses. The sample includes 2,614 SEO announcements in the period from 1985:1 to 2005:4.

Panel A: SEO announcements sorted on pre-announcement quarter new holdings

		All announcements		Announcements followed by an offer within 60 trading days
	N	*Announcement effect*	*Announcement* (+2,+61)	*Announcement* (+2,*offer*)
Low inst. demand (bottom 3 quintiles)	803	−1.33%	1.08%	−1.21%
4th inst. demand quintile	585	−2.24%	2.97%	0.87%
High inst. demand quintile	1,226	−1.94%	5.76%	1.71%
High minus low		**−0.61%** (**−1.97**)	**4.68%** (**3.83**)	**2.91%** (**3.44**)

Panel B: Calendar-time analysis

	All quarters		Quarters with at least 10 observations	
	Announcement (+2,+61)	*Announcement* (+2,*offer*)	*Announcement* (+2,+61)	*Announcement* (+2,*offer*)
Low inst. demand (bottom 3 quintiles)	0.76%	−0.77%	1.09%	−1.47%
4th inst. demand quintile	2.61%	0.62%	3.74%	1.19%
High inst. demand quintile	6.08%	1.36%	5.83%	1.75%
High minus low	**5.31%** (**3.50**)	**2.13%** (**2.84**)	**4.74%** (**3.73**)	**3.22%** (**3.92**)

not be valid. To address this concern, we resort to calendar-time analysis. Each quarter, we calculate the average post-announcement characteristic-adjusted stock return of low-institutional demand announcers, and do the same separately for high-institutional demand announcers. We then calculate the time-series averages of these two quarterly return series and the time-series *t*-statistic associated with their difference. Panel B of Table 10 reports the results. The sample includes all quarters in the first two columns, and quarters in which there are at least a total of ten SEO announcements in the last two columns. In both cases, we find that the average post-announcement return for the high-institutional demand group is similar to the corresponding return reported in Panel A. The difference between high and low institutional demand groups is statistically highly significant.

The main conclusion from Table 10 is that issuers with strong pre-announcement institutional demand exhibit significantly positive post-announcement stock returns. What may account for this return performance? One possibility is that previous quarter's institutional investor demand is not public information at the time of SEO announcements (at least in some cases). Institutional investors are required to report their end-of-quarter holdings within the first half of the next quarter, and many of them file their reports close to mid-quarter. Thus, the return predictability in Table 10 may be driven by SEO announcements that take place in the first half of quarters (i.e., before institutions report their holdings). We find that this is not the case. In unreported analysis, we obtain similar results for the subsample of announcements that take place in the second half of quarters, by which time previous quarter's holdings data are publicly available. Thus, the possibility that institutional demand is private information does not explain the post-announcement return predictability.

Another possibility is that the market initially overreacts to SEO announcements by firms with strong pre-announcement institutional demand (or at least this was the case during our sample period). As we discuss in Section 4.3, potential issuers may receive privileged information about pending institutional investor demand for their stock through their investment banks. Thus, some of the announcements in the high-institutional demand group may be by firms that anticipate continued strong institutional demand in the near future. To the extent that market participants fail to recognize this pattern, they may first negatively react to these SEO announcements and then get positively surprised by subsequent strong demand.

To summarize, (i) high- and low-institutional demand issuers receive similar negative price reactions at SEO announcement, but (ii) high-institutional demand issuers rebound from the initial reaction, whereas low-institutional

demand issuers experience further price declines until the offer. From a market efficiency perspective, the delayed effect of institutional demand is puzzling. For issuers, however, what matters is clearly the offer price, not the stock price immediately after the SEO announcement. In this regard, the findings do indicate a positive impact of institutional demand on market reception. It appears that high-institutional demand issuers can expect to complete their SEOs without putting negative pressure on their stock prices.

5.2. Short-run stock returns following the offer

The analyses so far concern institutional investor demand prior to the issuance decision. We now turn to institutional investor demand around the offer date. Our working assumption throughout has been that institutional demand conveys information about firms' intrinsic values. Issuers' post-offer stock returns provide a nice laboratory to analyze this informational role. Institutional investors are likely to obtain/produce substantial valuation-relevant information in the process of scrutinizing the issuer prior to the offer. More positive information induces greater institutional demand, both in the secondary market and for the newly issued shares. Once the offer is completed, the market starts learning about offer-period institutional demand, initially through informal channels (e.g., rumors) and then by observing institutions' holding reports. The resulting changes in issuers' stock prices are useful to assess the significance of information conveyed by institutional demand.

We use offer-quarter values of *new holdings*, *change in existing holdings*, and *terminated holdings* to measure institutional demand during the offer period. Ideally, we would like to identify changes in holdings that are due to participation in the offer versus trading in the secondary market. The use of quarterly data makes it difficult to establish causality in some cases, a caveat that we comment on further below.

Table 11 reports the analysis. We sort all completed offers into five equal-sized groups based on institutional investor demand in the offer quarter. We then calculate characteristic-adjusted stock returns over different windows around and following the offer for each demand group in a sort. The demand variable is *new holdings* in Panel A, *change in existing holdings* in Panel B, and *terminated holdings* in Panel C. We also estimate regressions that include all three demand measures as explanatory variables. Standardized coefficient estimates from these regressions are reported in Panel D.

The first two return windows we consider are the three trading days around the offer $(-1,+1)$ and the 60 trading days following the offer $(+2,+61)$ (approximately one quarter). The former reflects the market's immediate reaction to the offer outcome, while the latter captures further resolution of uncertainty as the market receives more information about institutional demand. Issuers' characteristic-adjusted stock returns in both windows are positively related to *new holdings*. High-institutional demand issuers outperform low-institutional demand issuers by about 12% during the combined period $(-1,+61)$. Stock returns in $(+2,+61)$ are also positively related to *change in existing holdings* and negatively to *terminated holdings*.

The findings discussed above are not sufficient to establish a causal link from institutional demand to post-offer stock returns. Since the return and the demand measurement periods overlap, the results are also consistent with causality going in the opposite direction (e.g., high post-offer returns inducing institutional purchases in the secondary market). In the third column of Table 11, we replicate the analysis for issuers' characteristic-adjusted stock returns in the first full quarter following the offer (next quarter). There is no reverse causality concern in this case, since offer-quarter institutional demand clearly precedes the return measurement window. Stock returns in the next quarter are of interest because this is when institutions report the offer-quarter change in their holdings.[29] We see again that both *new holdings* and *change in existing holdings* predict issuers' next-quarter stock returns. As the regression coefficients in Panel D show, the two demand variables are jointly significant as well.[30] *Terminated holdings*, on the other hand, is not significant in predicting next quarter's return. The last two columns of Table 11 divide the next-quarter return into its first and second half-quarter components. Here, we see that the effects of offer-quarter demand variables on next quarter's return are largely concentrated in the first half of the quarter, which is when institutions report their holdings. This suggests that the market updates issuers' stock prices as data on institutional holdings become available. Overall, the evidence indicates that offer-period institutional demand conveys substantial valuation-relevant information to the market.[31]

5.3. Long-run stock returns

We conclude the empirical analysis by examining the long-run stock returns of issuers. As first shown by Loughran and Ritter (1995) and Spiess and Affleck-Graves (1995), SEO firms tend to underperform their return benchmarks in the five years following the offer. One interpretation of this finding is that issuers succeed in timing the market, but alternative explanations exist. A number of papers argue that underperformance is an artifact of not properly controlling for risk, either due to misspecification of the empirical asset pricing model (Brav,

[29] Of course, some institutions may buy shares in the offer and then immediately flip them in the secondary market, and others may buy only in the secondary market. The details of who buys in the offer are less relevant for our purposes, since we are primarily interested in the information content of institutional demand. As a signal of firm value, what matters is whether institutions choose to hold the stock, not whether they purchase the shares they hold in the offer or in the market.

[30] The correlation between *new holdings* and *change in existing holdings* across offer quarters is 0.05.

[31] The results in this section are consistent with and complement previous findings. Chen, Hong, and Stein (2002) find that the quarterly change in the number of mutual funds holding a stock positively predicts the stock's return in the subsequent six-to-12 months. In the context of SEOs, Gibson, Safieddine, and Sonti (2004) show that issuers with high institutional demand outperform those with low demand in the 12 months following the offer. Given their return estimation period, Gibson et al. interpret their finding as evidence of institutions' ability to predict long-term performance of SEO firms. Our results show that the return differential with respect to institutional demand is realized largely in the immediate post-offer period.

Table 11
Short-run stock returns following the offer.

The table reports characteristic-adjusted stock returns following the offer as a function of offer-quarter institutional demand. *Offer*(−1,+1) is the three-day characteristic-adjusted stock return around the offer date. *Offer*(+2,+61) is the 60-day characteristic-adjusted stock return following the offer. These return windows are measured in trading days. *Next quarter return* is the characteristic-adjusted stock return in the first full quarter following the offer. *Next quarter return* (1:45) is the characteristic-adjusted stock return in the first half of that quarter. *Next quarter return* (46:90) is the characteristic-adjusted stock return in the second half of that quarter. SEO firm-quarter observations are sorted into five equal-sized groups based on the offer-quarter institutional demand. Panels A, B, and C report average returns for the five institutional demand groups sorted on *new holdings*, *change in existing holdings*, and *terminated holdings*, respectively. Panel D reports coefficient estimates from regressions that include all three institutional demand measures as explanatory variables. The institutional demand measures in Panel D are scaled by their respective standard deviations. The *t*-statistics are reported in parentheses. The sample includes 2,293 SEO issuances in the period from 1985:1 to 2005:4.

Panel A: SEOs sorted on offer-quarter new holdings

	N	*Offer* (−1,+1)	*Offer* (+2,+61)	*Next quarter return*	*Next quarter return* (1:45)	*Next quarter return* (46:90)
Low institutional demand	457	−1.10%	−0.27%	−1.16%	−1.25%	−0.57%
2	459	−0.40%	1.41%	0.23%	−0.51%	−0.19%
3	459	0.10%	2.47%	0.56%	−0.71%	0.42%
4	459	0.58%	6.88%	1.16%	0.80%	0.27%
High institutional demand	459	1.65%	9.10%	3.55%	1.53%	1.08%
High minus low		2.76%	9.36%	4.71%	2.78%	1.64%
		(5.53)	(4.46)	(1.95)	(1.92)	(1.10)

Panel B: SEOs sorted on offer-quarter change in existing holdings

	N	*Offer* (−1,+1)	*Offer* (+2,+61)	*Next quarter return*	*Next quarter return* (1:45)	*Next quarter return* (46:90)
Low institutional demand	457	0.45%	2.14%	0.26%	−0.99%	0.97%
2	459	0.23%	2.48%	−0.62%	−1.18%	0.17%
3	459	0.14%	1.57%	−1.89%	−1.02%	−0.62%
4	459	−0.12%	5.35%	1.44%	0.88%	−0.83%
High institutional demand	459	−0.29%	6.78%	4.98%	1.90%	1.50%
High minus low		−0.74%	4.63%	4.72%	2.89%	0.53%
		(−1.33)	(2.42)	(1.87)	(2.01)	(0.37)

Panel C: SEOs sorted on offer-quarter terminated holdings

	N	*Offer* (−1,+1)	*Offer* (+2,+61)	*Next quarter return*	*Next quarter return* (1:45)	*Next quarter return* (46:90)
Low institutional demand	457	0.05%	5.83%	2.40%	0.56%	0.69%
2	462	0.29%	5.58%	0.05%	−0.20%	0.11%
3	464	0.11%	5.42%	1.96%	0.88%	0.47%
4	460	0.09%	1.62%	−0.62%	−1.18%	−0.27%
High institutional demand	450	−0.12%	−0.46%	−0.21%	−0.63%	−0.10%
High minus low		−0.17%	−6.28%	−2.61%	−1.20%	−0.79%
		(−1.33)	(−2.42)	(−1.17)	(−0.90)	(−0.64)

Panel D: Regression analysis

	Offer (−1,+1)	*Offer* (+2,+61)	*Next quarter return*	*Next quarter return* (1:45)	*Next quarter return* (46:90)
New holdings (*standardized*)	0.016	0.046	0.015	0.011	0.005
	(7.36)	(5.99)	(1.77)	(1.96)	(1.05)
Change in exiting holdings (*standardized*)	−0.003	0.013	0.022	0.013	0.000
	(−1.97)	(2.16)	(3.31)	(3.07)	(−0.08)
Terminated holdings (*standardized*)	−0.005	−0.019	−0.008	−0.004	−0.005
	(−2.00)	(−2.73)	(−0.85)	(−0.81)	(−0.96)

Geczy, and Gompers, 2000; Eckbo, Masulis, and Norli, 2000), or due to changing risk characteristics of issuers as they exercise their real investment options (Carlson, Fisher, and Giammarino, 2006). There is also substantial evidence that underperformance is not limited to equity issuers. Long-run returns are also low for debt issuers (Spiess and Affleck-Graves, 1999), and more generally for firms with high real-investment rates (Cooper, Gulen, and Schill, 2008). The latter effect accounts for a substantial part of SEO underperformance (Lyandres, Sun, and Zhang, 2008).

Long-run underperformance is not the main focus of our study. Our limited goal in this section is to investigate

whether low long-run returns concentrate among issuers with high institutional investor demand. Our results so far show that firms strongly time their equity issues to coincide with periods of high institutional demand. Furthermore, high-institutional demand issuers exhibit substantially better stock return performance than low-institutional demand issuers during and following the offer period. We interpret these findings as outcomes of institutional investors being well-informed. But perhaps high institutional demand causes overvaluation, and firms take advantage by issuing equity. If this is the case, one might expect high-institutional demand issuers to underperform low-institutional demand issuers in the long run.

We use two different approaches to detect long-run return performance, event-time and calendar-time. The event-time approach is based on computing average monthly characteristic-adjusted stock returns of issuers over one/three/five years following the SEO. We use this approach only in a descriptive fashion, as statistical inference based on event-time long-run returns is problematic (Barber and Lyon, 1997; Brav, 2000). Our statistical tests are based on the calendar-time approach, which consists of calculating monthly alphas from Fama-French three-factor time-series regressions for portfolios of firms that have conducted SEOs in the past one/three/five years. Since the previous section already documents the effect of institutional demand on stock returns in the first full quarter following the offer, here we focus on long-run returns starting from the end of that quarter.

Table 12 reports the results. Panel A confirms the finding in previous studies that SEO firms exhibit low stock returns in the five years following the offer. Underperformance is weak in event-time returns, because there is a large number of SEOs in the late 1990s that did not underperform their benchmarks. Calendar-time returns exhibit significantly negative alphas that are similar in magnitude to those shown in previous studies (e.g., Brav, Geczy, and Gompers, 2000).

Of more interest is whether underperformance varies as a function of institutional demand for issuers' stocks. We consider two ways to measure institutional demand: *new holdings* in the quarter prior to SEO announcements (i.e., as in Table 10), and *new holdings* in the offer quarter (i.e., as in Table 11). The high and low institutional demand groups for these variables are defined as in the previous two subsections. The results, reported in Panels B and C of Table 12, show that issuers with high versus low institutional demand do not differ substantially in their long-run return performance. The differences between the two groups are small, positive in some cases and negative in others, and statistically insignificant for the most part (except for three- and five-year returns in Panel B). More importantly, there is no evidence that the large post-offer returns that high-institutional demand issuers enjoy are reversed in the long run.[32] We conclude that the institutional demand effects that we show in previous sections are unrelated to the long-run underperformance phenomenon.

[32] Recall that the long-run return estimation period starts from the end of the first full quarter following the offer.

6. Conclusion

It is well-known that firms are more likely to issue equity following periods of high stock returns. We show that this stylized fact is concentrated in periods in which high stock returns coincide with strong demand from institutional investors. Stock price increases that are not accompanied by institutional purchases have little impact on the likelihood of equity issuance.

Institutional investor demand affects issuers' stock prices throughout the offer period as well. Issuers with high pre-announcement demand outperform those with low demand during the post-announcement period; as a result, they are able to issue shares at relatively more attractive prices. Also, issuers with high offer-period demand experience significant gains in the short run following the offer. There is no evidence that these gains are reversed subsequently.

The contribution of this paper is twofold. First, the findings highlight the relevance of institutional investors for corporate financing activity. The analyses of the issuance decision and subsequent stock returns suggest that institutional investors play an important certification role in equity issues. Second, the results help establish a better understanding of how firms time their equity issues in practice. Studies on market timing typically focus on the role of high stock prices in triggering equity issues. Our results qualify this role by revealing a second and equally important dimension of timing, namely, whether the prevailing stock price can be sustained in the case of an equity issue. Potential issuers appear to gauge this factor based on the type of demand that supports their market valuations.

Appendix A. A model of the impact of institutional investor demand on the equity issuance decision

In this section we sketch a simple model that characterizes a firm's equity issuance decision in the presence of informed trading by institutional investors. The model formalizes the discussion in Section 2.2.

There are three dates (1, 2, and 3), the discount rate is zero, and all agents are risk-neutral. There is one all-equity financed firm that is either a "good" or a "bad" type. The probability of a good type is θ. The firm type is characterized by the date-3 payoff assets-in-place generate, which is $V=V_G$ for a good type and $V=V_B<V_G$ for a bad type. The firm's insiders (e.g., a manager) know V at date 1. Outside shareholders have access to public information only. In addition to its assets-in-place, the firm has liquid resources (e.g., cash) worth C at date 1.

We model the firm's need to issue equity as stemming from a liquidity shock to its investment spending. Specifically, the firm has a project that requires investment at date 2 and pays off at date 3. The project normally costs C and pays $F>C$, so the firm can finance it using its liquid resources. However, with probability λ, the firm receives a liquidity shock, in which case the project costs $C+\Delta$ and pays $F+\Delta$. Whether the firm is hit by the liquidity shock is observed only by the firm's insiders, not outside investors. Notice that the shock does not alter the NPV of the project, it simply increases the project cost and makes the firm

Table 12
Long-run stock returns.

The table reports long-run stock returns following SEOs. Panel A reports the long-run performance for the entire SEO sample. Panel B (C) reports the performance for SEOs with high and low pre-announcement (offer) quarter institutional demand as measured by *new holdings*. The high (low) institutional demand group in Panel B includes SEOs in the highest (lowest three) pre-announcement quarter demand quintile(s). The high (low) institutional demand group in Panel C includes SEOs in the highest (lowest) offer quarter demand quintile. SEOs with more than 60 trading days between announcement and offer are excluded in Panel B. Event-time returns are cross-sectional averages of SEO-specific average monthly characteristic-adjusted returns calculated over one/three/five years following the SEO. Calendar-time returns are monthly three-factor alphas of portfolios of firms that conduct SEOs in the past one/three/five years. High minus low is a zero-cost portfolio with a long (short) position in high (low) institutional demand portfolio. The sample includes 2,293 SEO issuances in the period from 1985:1 to 2005:4. The *t*-statistics are reported in parentheses.

	Event-time returns			Calendar-time returns		
	1 Year	3 Years	5 Years	1 Year	3 Years	5 Years
Panel A: All SEOs						
All SEOs	−0.36	−0.17	−0.04	−0.79 (−4.31)	−0.65 (−4.21)	−0.43 (−3.05)
Panel B: SEOs sorted by pre-announcement quarter new holdings						
Low inst. demand	−0.31	−0.05	0.10	−0.68	−0.43	−0.29
High inst. demand	−0.55	−0.23	−0.20	−0.83	−0.75	−0.53
High minus low	−0.23	−0.18	−0.30	−0.15 (−0.64)	−0.32 (−2.32)	−0.24 (−1.92)
Panel C: SEOs sorted by offer-quarter new holdings						
Low inst. demand	−0.69	−0.22	−0.17	−0.82	−0.48	−0.38
High inst. demand	−0.35	−0.08	0.04	−0.32	−0.61	−0.31
High minus low	0.34	0.14	0.21	0.50 (1.26)	−0.13 (−0.53)	0.07 (0.37)

dependent on external financing at date 2. We assume that the firm can only issue equity to raise capital.

The stock is traded once, at date 2. A competitive market maker observes the order flow and sets the stock price, as in Kyle (1985). The order flow comes from a group of potentially informed investors that we refer to as "institutions." Institutions as a group buy d shares, where $d \in \{d_L, d_H\}$ and $d_L < d_H$. Specifically, with probability q, institutions observe the firm type. In this case, institutions buy $d = d_H$ shares if the firm value conditional on their private information exceeds the stock price, and $d = d_L$ shares otherwise.[33] With probability $1-q$, institutions are uninformed. We treat institutions' order flow in this case as noise trading: they buy $d = d_H$ shares with probability z and $d = d_L$ shares with probability $1-z$, where the realization of d is uncorrelated with firm type.[34]

The timing of the events is as follows. At date 1, the firm announces whether it will raise capital in an SEO or not. At date 2, the firm's stock is traded. For simplicity, we do not model the details of the SEO process; we assume that the firm sells the newly issued shares at the date-2 market price. At the final date 3, the firm's cash flows from the assets-in-place and project are paid to shareholders.

We start by characterizing the stock price at date 2 following an SEO announcement at date 1.[35] Suppose that, in equilibrium, the good type issues equity only when it is hit by the liquidity shock, whereas the bad type always issues. Given these equilibrium beliefs and the order flow d, the market maker clears the market at price P, which equals the expected value of the firm's date-3 payoff:

$$P = \begin{cases} P_H = \dfrac{\theta\lambda(q+(1-q)z)V_G + (1-\theta)(1-q)zV_B}{\theta\lambda(q+(1-q)z) + (1-\theta)(1-q)z} + F + \Delta & \text{if } d = d_H, \\ P_L = \dfrac{\theta\lambda(1-q)(1-z)V_G + (1-\theta)(q+(1-q)(1-z))V_B}{\theta\lambda(1-q)(1-z) + (1-\theta)(q+(1-q)(1-z))} + F + \Delta & \text{if } d = d_L. \end{cases} \tag{A.1}$$

The stock price P is increasing in λ. In other words, the market reacts more negatively to an equity issue when the liquidity motive for issuance is less likely. Notice that the market reaction in this model is stochastic; it depends on institutional order flow. If $q > 0$ (i.e., when the order flow is informative about firm type), the market maker responds to high demand by setting a relatively high stock price $P_H > P_L$.

We now turn to the firm's SEO decision at date 1. The bad type is clearly strictly better off issuing as long as the good type issues with positive probability. Even when the bad type does not need external capital, pooling with the good type enables it to sell overvalued stock. We assume that the bad

[33] One can think of d_L as being negative or zero.

[34] The assumption that institutions act as noise traders when uninformed is immaterial and made only for expositional simplicity. The results are qualitatively the same when aggregate order flow is modeled as the sum of institutions' demand and a separate random variable that represents noise traders' demand.

[35] The stock is traded regardless of the firm's announcement at date 1, but the pricing of the stock in case of no announcement is irrelevant for our analysis.

type does not issue when indifferent. This would be the case if the bad type is not hit by the liquidity shock and the good type issues with probability zero in equilibrium.

The good type never issues equity if it is not hit by the liquidity shock. The firm does not need external financing in that case and wants to avoid being pooled with the bad type. When the good type does get hit by the liquidity shock, it decides whether to issue by comparing the payoffs of its existing shareholders with and without issuing equity:

$$\text{Issue equity} \Leftrightarrow \left[(q+(1-q)z)\left(1-\frac{\Delta}{P_H}\right)+(1-q)(1-z)\left(1-\frac{\Delta}{P_L}\right)\right] \times (V_G+F+\Delta) > V_G+C. \quad \text{(A.2)}$$

The expression on the left-hand side of (A.2) is the expected payoff from issuing equity. While the firm invests in the project in this case, the existing shareholders receive only a fraction of the firm's date-3 payoff. Notice that this fraction is higher when the equity issue takes place at P_H than P_L. The expression on the right-hand side is the payoff from not issuing. In this case, existing shareholders receive all of firm's date-3 cash flow, but the firm has to pass up the project.

Let us first consider the benchmark case of no informed trading, i.e., $q=0$. In this case, the model boils down to a variant of Myers and Majluf (1984). The issuance condition (A.2) now simplifies to

$$F-C > \left(\frac{V_G+F+\Delta}{\overline{P}}-1\right)\Delta, \quad \text{(A.3)}$$

where

$$\overline{P} = \frac{\theta\lambda V_G+(1-\theta)V_B}{\theta\lambda+1-\theta}+F+\Delta \quad \text{(A.4)}$$

is the date-2 stock price in case of no informed trading. It is easy to see that (A.3) will be violated when the NPV of the project $F-C$ is sufficiently small or the liquidity shock Δ is sufficiently large. In that case, the liquidity-constrained good type prefers to pass up the project rather than issue undervalued equity. Thus, only the liquidity-constrained bad type issues equity in equilibrium.

Now consider the case where the stock price is determined in response to informed trading activity, i.e., $q>0$. In this case, the offer price is stochastic and depends on institutional order flow d. A high realization d_H pushes up the stock price to $P=P_H>\overline{P}$, whereas a low realization d_L pushes the price down to $P=P_L<\overline{P}$. From the perspective of uninformed market participants, the expected value of P conditional on an SEO announcement (but before trading takes place) is $\overline{P}$. From the perspective of a good-type firm, however, the expected value of P exceeds $\overline{P}$. This is because the firm knows that its type is good and hence anticipates institutional order flow to be d_H provided that institutions are informed. It is easy to show that the expected payoff of a liquidity-constrained good type from issuing (the left-hand side of (A.2)) is increasing in q. In fact, this payoff approaches the symmetric-information value V_G+F as $q\to 1$. Therefore, for q sufficiently high, the liquidity-constrained good-type issues equity in equilibrium. In that equilibrium, the bad type also issues, regardless of whether it is liquidity constrained.

To summarize, informed trading by institutions makes equity issuance more likely. Intuitively, the good type relies on strong institutional demand to keep its stock price relatively high and prevent an undervalued issue. We interpret date-2 in the model as corresponding to the period from the announcement of an offer to its completion. Trading by informed institutions during this period allows their information to get incorporated into the stock price, increasing the informational efficiency of the offer price and reducing room for misvaluation.

In the simple model above, θ parameterizes public information regarding firm type prior to the SEO announcement, while q parameterizes the likelihood of informed trading by institutions during the offer period. The discussion in Section 2.2 centers around how recent institutional investor demand affects the issuance decision through these two channels. Specifically, high recent demand reveals the valuation signals of a large number of institutions, which allows the market to better assess the intrinsic value of the firm. In the model, this would correspond to θ being more informative about the true firm type (i.e., close to one for good type and close to zero for bad type). Also, high demand indicates the presence of a large number of institutions that have been analyzing the stock recently, which makes informed institutional trading more likely during the offer period. This corresponds to an increase in q in the model. For simplicity, we do not model pre-announcement institutional demand and its effects on θ and q; however, the model can easily be extended to exhibit these features explicitly.

Appendix B. Data sources and variable definitions

Variable	Definition and source
Panel A: Institutional demand variables	
New holdings$_{i,t}$	The number of institutions that initiate a holding in stock i in quarter t, normalized by the number of institutional shareholders of the stock at the beginning of quarter t. (*Source*: CDA/Spectrum Institutional (13F) database)
Change in existing holdings $_{i,t}$	The number of existing institutional shareholders that increase their holdings *minus* the number of those that decrease or terminate their holdings in stock i in quarter t, normalized by the number of institutional shareholders of the stock at the beginning of quarter t. (*Source*: CDA/Spectrum Institutional (13F) database)
Terminated holdings$_{i,t}$	The number of existing institutional shareholders that terminate their holdings in stock i in quarter t, normalized by the number of institutional shareholders of the stock at the beginning of quarter t. (*Source*: CDA/Spectrum Institutional (13F) database)
Panel B: Return variables	
Characteristic-adjusted stock return	Raw stock return minus the equal-weighted average return of the benchmark portfolio to which the stock is assigned. To construct the benchmark portfolios used in quarter t, firms are first sorted into five size portfolios based

	on their market equity at the beginning of quarter $t-1$ using NYSE size quintile breakpoints. Within each of these size portfolios, firms are then sorted into five B/M portfolios based on their book equity divided by market equity at the beginning of quarter $t-1$. (*Source*: CRSP and Compustat)
Lagged six-month stock return	Characteristic-adjusted stock return in the two quarters prior to quarter *t*. (*Source*: CRSP and Compustat)

Panel C: Firm and stock characteristics

Market-to-book ratio	Market equity plus book assets minus book equity divided by book assets. (*Source*: Compustat and CRSP)
Firm size	Logarithm of book assets in 2005 dollars. (*Source*: Compustat)
Firm age	Logarithm of the number of quarters since the first appearance of the firm in CRSP. (*Source*: CRSP)
IPO dummy	Indicator variable: one if the firm has been public for less than two years (we take the first appearance of the firm in CRSP as the IPO date). (*Source*: CRSP)
Profitability	Earnings before interests, taxes, depreciation, and amortization (EBITDA) over book assets. (*Source*: Compustat)
Investment	Capital expenditures divided by book assets. (*Source*: Compustat)
R&D	Research and development expenditures divided by book assets. (*Source*: Compustat)
Leverage	Book debt divided by book assets. (*Source*: Compustat)
Volatility	Annualized standard deviation of daily stock returns measured over one quarter. (*Source*: CRSP)
Turnover	Quarterly share trading volume divided by shares outstanding. (*Source*: CRSP)
Amihud measure	Quarterly average of absolute value of daily stock return divided by daily dollar trading volume. (*Source*: CRSP)
Institutional ownership	Fraction of shares outstanding owned by institutional investors in our data set. (*Source*: CDA/Spectrum Institutional (13F) database)

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