JOURNAL OF FINANCIAL AND QUANTITATIVE ANALYSIS Vol. 45, No. 3, June 2010, pp. 739–762

doi:10.1017/S0022109010000268

Market Feedback and Equity Issuance: Evidence from Repeat Equity Issues

Armen Hovakimian and Irena Hutton*

Abstract

Higher first-year post-issue returns are associated with a significantly higher probability of follow-on equity issuance over the next 5 years. This result holds when we control for pre-issue returns and other factors known to affect the probability of equity issuance. The result is most consistent with the market feedback hypothesis that a high post-issue return encourages managers to increase the firm's investment because it implies that, in the market's view, the marginal return to the project is high.

I. Introduction

In corporate finance, market feedback refers to the hypothesis that stock returns provide information, otherwise not available to the managers, about the profitability of the firm's projects. High returns convey the market's belief that the marginal return to the firm's projects is high, which encourages managers to raise additional capital and increase the firm's investment. Jegadeesh, Weinstein, and Welch (1993) offer this hypothesis to explain their finding that high returns following an initial public offering (IPO) are associated with a higher probability of follow-on seasoned equity offerings (SEOs) within 3 years of the IPO.[1]

*Hovakimian, armen.hovakimian@baruch.cuny.edu, Zicklin School of Business, Baruch College, One Bernard Baruch Way, New York, NY 10010; Hutton, ihutton@cob.fsu.edu, College of Business, Florida State University, Rovetta Business Bldg., Tallahassee, FL 32306. We thank Turan Bali, Hendrik Bessembinder (the editor), Jeffrey Coles (associate editor and referee), Masako Darrough, Ozgur Demirtas, Ken French, Sheridan Titman, and seminar participants at Baruch College and Florida State University for helpful comments. Hovakimian gratefully acknowledges financial support from the PSC-CUNY Research Foundation of the City University of New York.

[1] Habib, Johnson, and Naik (1997) use market feedback as a rationale for spin-offs. Subrahmanyam and Titman (1999) argue that serendipitous information offered by the public equity market is an important reason for going public. Stoughton, Wong, and Zechner (2001) show that stock price information generated during an IPO can help consumers to discern the quality of the firm's product. Van Bommel (2002) presents a model where the issuer sets a low IPO price to induce information production by investors and then uses the feedback from the market in its investment decisions.

In this paper we test and find support for the market feedback hypothesis for a sample of firms that issue seasoned equity repeatedly. Specifically, our results show that firms exhibiting better stock market performance in the year following the issuance of seasoned equity are significantly more likely to return to the market for additional rounds of financing within the next 5 years.

Our focus on repeat SEOs is motivated by several considerations. First, SEOs are a natural choice for examining the market feedback hypothesis for publicly traded firms, as information production by investors is likely to intensify around SEOs. Almazan, Suarez, and Titman (2009) argue, for example, that an SEO may serve as a catalyst that induces investors to subject the firm to additional scrutiny and generate additional information about the firm in the process. A similar point is also made by Easterbrook (1984), who contends that agency costs of free cash flow are reduced when firms pay out a larger portion of their cash flows. Such firms have to seek external financing to fund their projects, which subjects their investment plans to closer investor scrutiny. In addition, Fulghieri and Lukin (2001) and Chemmanur and Jiao (2010) present models where managers with favorable private information issue equity and induce sophisticated investors to generate information about the firm, thus reducing the information asymmetry. On the empirical side, Gibson, Safieddine, and Sonti (2004) and Chemmanur, He, and Hu (2009) report evidence consistent with the view that institutional investors generate information about firms conducting SEOs and are able to trade profitably on such information.

Second, the feedback effect found to be important for newly public firms may or may not be important for firms that have enjoyed the benefits of publicly traded shares for some time. Although the importance of stock prices for equity issuance is widely acknowledged in the literature, the question still remains whether firms are responding to feedback from the market or are simply timing with respect to perceived market mispricing.[2] In an earlier paper, Mikkelson and Partch (1988) find that firms that experience negative post-announcement returns tend to withdraw their announced SEOs. Alderson and Betker (2000) observe continued underperformance for up to 3 years after the withdrawal of the offering. While these results could be interpreted as consistent with market feedback, Clarke, Dunbar, and Kahle (2001) report evidence of insider trading around the withdrawn equity issues that is more consistent with insiders knowingly attempting to sell overvalued equity.

In this regard, our finding of a positive relation between the first-year post-issue returns and the likelihood of follow-on equity issuance is different from the existing evidence that equity issues are timed to follow periods of high returns. Specifically, we find that a high first-year post-issue return is associated with an increased probability of follow-on equity issuance for up to 5 years after the issue. The long-term impact of the effect suggests that it is not due to short-term timing with respect to pre-issue returns. Furthermore, this relation remains significant when we control for other factors known to affect the likelihood of equity issuance, including various proxies for potential mispricing.

[2]See, for example, Baker and Wurgler (2002) and Hovakimian (2006).

We also consider the possibility that the positive relation between the post-issue return and the probability of follow-on equity issuance could arise if other factors were associated with both a higher post-issue return and a higher probability of follow-on issuance. While there could be many such potentially omitted factors, 2 candidates stand out because of their prominent roles in the hypotheses advanced by the earlier research to explain the patterns of stock returns around equity issues.

First, the earlier literature has linked the managers' apparent market timing ability to earnings manipulation that allows managers to inflate their earnings and stock price (Teoh, Welch, and Wong (1998)) at the time of the issue. After the issue, as earnings manipulation cannot be sustained, the returns decline, reflecting poor operating performance. If firms expecting to issue equity repeatedly do not manage their earnings as aggressively, then their post-issue returns are likely to be higher. Such behavior could generate the observed positive correlation between post-issue returns and the probability of follow-on equity issuance.

The second potential explanation is based on the premise that managers are asymmetrically better informed than the market about firm value. Lucas and McDonald (1990) show that managers with favorable private information may postpone their equity issues until after the positive news is released. Extending this line of reasoning, if a firm with favorable private information experiences a liquidity shock forcing it to raise new equity, it may issue the least amount possible and defer the rest of the financing for later issuance after the favorable information becomes public.[3] This may induce a positive relation between post-issue returns and the likelihood of follow-on equity issuance.

We do not find support for these alternative explanations of our results in that managers make similar issue size and earnings management decisions regardless of whether they issue again in the near future. In addition, our evidence regarding pre-issue returns is not consistent with the hypothesis that unexpected liquidity shocks prevent firms from timing these issues in the most advantageous way. Equity issues are timed aggressively with respect to pre-issue returns, which are high regardless of whether there are follow-on issues. We conclude that the positive relation between post-issue returns and the probability of follow-on equity issuance is unlikely to be related to managerial private information or earnings management.

An analysis of the nature of the feedback mechanism offers additional support for the hypothesis that the positive relation between the post-issue returns and the probability of follow-on equity issuance is due to market feedback. First, we find that firms with higher post-issue returns exhibit significantly higher rates of capital investment for up to 5 years after the issue.[4] Second, higher post-issue

[3]In an IPO context, Allen and Faulhaber (1989) and Welch (1989) present models where high quality issuers pool and set the same IPO price as the low quality issuers, but defer a portion of the planned issue for a later seasoned offering after the market learns their true type.

[4]In an IPO context, Van Bommel and Vermaelen (2003) find that positive feedback generated during the IPO process is followed by positive abnormal capital expenditures. Hill and Hillier (2009) use a sample of U.K. IPOs to show that poor returns at the IPO significantly affect corporate investment in the period after the offering, especially for firms with better investment opportunities and lower fixed assets.

returns are associated not only with a higher likelihood of follow-on equity issuance but also with a higher likelihood of follow-on debt issuance. These results are consistent with the hypothesis that the impact of post-issue returns reflects that market feedback is about the firm's investment policy rather than equity mispricing. Third, we find that it is the abnormal part of the post-issue return that is associated with increased probability of follow-on issuance, which is in line with the view that the market feedback is about specific investments undertaken at the time of the equity issuance. Fourth, consistent with the view that market feedback is provided by sophisticated investors that generate additional information around the time of the SEO, we observe an increase in institutional portfolio rebalancing following SEOs. Furthermore, increases in institutional ownership are associated with a higher likelihood of a follow-on offering, consistent with market feedback.

The paper is organized as follows. In Section II we discuss our sample. In Section III we document the relation between post-issue market performance and the likelihood of follow-on equity issuance. In Section IV we examine the effect of post-issue market performance on subsequent equity issuance decisions while controlling for other factors. In Section V we present additional evidence in support of the market feedback hypothesis. In Section VI we summarize our findings.

II. Sample

Our initial sample is drawn from annual Compustat files covering the 1970–2003 period. The sample is then matched with fiscal year annual returns calculated using monthly stock return data from the Center for Research in Security Prices (CRSP).[5] To eliminate the confounding effects introduced by specific regulatory environments, we exclude financial (Standard Industrial Classification (SIC) codes 6000–6999) and utility (SIC codes 4900–4999) firms. To minimize the influence of outliers in our analysis, we also exclude firms with values of total assets or sales of less than $1 million and we replace extreme observations of all ratio variables (those with the highest 1% and, for variables with negative values, the lowest 1% of values) with missing values. The resulting sample consists of 168,128 firm-year observations.[6]

The sample of seasoned common equity offerings that took place over the 1970–2003 time period is obtained from Thomson Financial's Securities Data Corporation (SDC) database. Following other new issue studies, we exclude issues by non-U.S. firms, private placements, pure secondary issues, rights issues, shelf registration issues, and unit offerings. To remain in our sample, each issuer has to have matching annual financial statements data in Compustat. Some firms

[5]We measure the stock returns on a fiscal year basis because financial statement variables are only available on this basis. A mismatch in measurement periods could inflate the significance of the returns in multivariate analyses simply because they reflect information from a period not covered by financial statement variables.

[6]The number of usable observations varies by the analysis performed, since certain variables have more missing values than others.

conduct more than 1 offering within the same fiscal year. Given the annual frequency of the financial statements data, such issues cannot be distinguished from each other based on the characteristics of the issuing firm. Therefore, only the earliest issue is retained. The resulting sample contains 3,797 equity issues by 2,782 firms.[7] The number of issues ranges from 16 in 1974 to 292 in 1996. Of these issues, 1,901 (50.1%) are by firms that issue equity only once, 996 (26.2%) are by firms that issue twice, 487 (12.8%) are by firms that issue 3 times, and 413 (10.9%) are by firms that issue 4 times or more.

Table 1 presents the descriptive statistics for several traditional measures of stock performance around equity issues. These characteristics are reported separately for firm-years with and without equity issues. Consistent with previous literature, firms in our sample issue equity when their valuations are high. The average stock return over the preceding fiscal year is significantly higher for firms that issue equity (0.526) than for firms that do not issue equity (0.096). Similarly, the equity issuers' pre-issue market-to-book (MB) ratios (2.432) are significantly higher than the ratios of nonissuing firms (1.620).[8] Furthermore, issuers have higher valuations than their industry peers, in that the industry-adjusted MB ratios of equity issuers are significantly positive, whereas the industry-adjusted MB ratios of nonissuers are significantly negative.[9]

TABLE 1

Summary Statistics for Seasoned Equity Issuers and Nonissuers

The No Equity Issue column summarizes firm-years without SEOs of publicly traded Compustat firms. The market-to-book (MB) ratio is (total assets – book value of common equity + market value of common equity)/total assets. Industry-adjusted MB ratio is the (MB – industry mean MB)/MB, with industry defined based on 2-digit SIC codes. RETURN(–1) is the return over the preceding year. RETURN(+1) is the return in the following year. Abnormal returns are measured relative to book-to-market and size-matched portfolios of nonissuing firms. Number_of_Issues is the number of times the firm has issued equity after its IPO until it exits our sample. Time between consecutive issues is measured in years. * and ** indicate returns and industry-adjusted MB ratios significantly different from 0 at the 5% and 1% levels, respectively. Values in the No Equity Issue column that differ significantly at the 1% level from corresponding values in the Equity Issue column are marked [a].

Variables	Equity Issue	No Equity Issue
MB	2.432	1.620[a]
Industry-adjusted MB	0.048**	–0.280**[a]
RETURN(–1)	0.526**	0.096**[a]
RETURN(+1)	–0.027**	0.127**[a]
Post-issue 1-year abnormal return	–0.052**	
Number_of_Issues per firm	1.900	
Time between consecutive issues	4.116	
No. of observations	3,797	164,331

We also observe that equity issuers, on average, experience a decline in post-issue returns. The post-equity issue returns (–0.027) are significantly lower

[7]Due to the restrictions placed on the data, our sample size is smaller than those used in some SEO studies. However, it is comparable to the samples used in several SEO studies spanning 20-30 years after 1970. Purnanandam and Swaminathan (2006) use about 1,700 SEOs; Choe, Masulis, and Nanda (1993) use 1,456 SEOs; and Teoh et al. (1998) analyze 1,265 SEOs.

[8]The MB ratio of assets is (total assets (Item 6) – book value of common equity (Item 60) + market value of common equity (Item 199 × Item 25))/total assets.

[9]Industry-adjusted MB ratio is (MB – industry mean MB)/MB. We use 2-digit SIC code industry definitions throughout this paper.

than the returns of nonissuing firms.[10] The buy-and-hold 1-year abnormal returns are significantly negative relative to those of benchmark nonissuers matched on MB and size, consistent with earlier studies employing this methodology. Our matching procedure follows Jegadeesh (2000). We match every issuer with a benchmark portfolio of nonissuers based on their size and MB at the end of the fiscal year preceding the offer. The nonissuers are identified using a 2-step procedure. First we identify all nonissuers in the same size decile.[11] Of those, we pick the 10 with the closest MB ratio. The benchmark return is the return on the equal-weighted portfolio of these 10 firms.

To summarize, the results in Table 1 are consistent with earlier studies that find that equity issuers' returns are unusually high prior to an issuance, while their post-issue returns are unusually low.

III. Post-Issue Market Performance and Follow-On Equity Issuance

In this section we present some initial results relating the returns in the first post-issue year to the probability of follow-on equity issuance. Given that our discussion will frequently refer to the current, as well as the past and future equity issues, it is useful to fix the time line and the related notation. Figure 1 illustrates the time line in SEO event time. Unless otherwise noted, an equity issue (SEO) always refers to the current SEO, and all the firm characteristics are observed at the beginning of the current period, t. RETURN(–1) (pre-issue return) is the return over the preceding fiscal year, $t-1$. RETURN(+1) (post-issue return) is the return in fiscal year $t+1$. Previous issue (SEO) refers to the last equity issue prior to the current year, t. If the previous issue was in year $t-n$, then the post-previous-issue return, PR(+1), refers to the return in year $t-n+1$. Future (follow-on) issue refers to the first equity issue subsequent to the current year, t.

A. Post-Issue Returns and the Probability of Follow-On Equity Issuance

Panel A of Table 2 reports the frequency of equity issuance during each of the first 6 years after the previous issue (vertical dimension) for observations grouped into post-previous-issue return (PR(+1)) quintiles (horizontal dimension). Observations with 7 or more years since the previous issue are combined into a single group.

We observe a very high propensity to issue equity in years 1 and 2 after the issue for firms with the highest post-previous-issue returns (quintiles 4 and 5). For example, in the first year after the issue, 18.3% of firms from the top PR(+1) quin-

[10]These average first-year post-issue returns are somewhat lower than those in some of the earlier papers. This is primarily due to differences in the time periods covered and the inclusion of financial firms in these earlier studies. When we adjust for these differences in sample composition, our average post-issue returns become statistically insignificantly different from 0, consistent with earlier literature.

[11]Nonissuers are firms that have not issued equity in the previous 5 years. Since our sample starts in 1970, this requirement makes it impossible to calculate abnormal returns for observations prior to 1975.

FIGURE 1

A Time Line for Repeat Equity Issues

Figure 1 illustrates the time line in SEO event time. Current, previous, and future issues refer to SEOs at various points on the time line. RETURN(−1) is the stock return in the fiscal year preceding the current issue. RETURN(+1) is the stock return in the fiscal year following the current issue. PR(+1) is the stock return in the fiscal year following the previous issue.

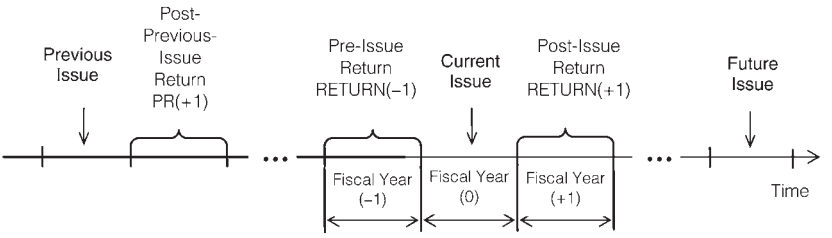

TABLE 2

Post-Issue Returns and Probability of Follow-On Issuance

Panel A of Table 2 reports the fraction of equity issuance for groups based on a 2-way independent sort by post-previous-issue return quintile (horizontal dimension) and years from previous issue. Panel B reports post-issue return sorted by Offer_After_IPO (horizontal dimension) and Number_of_Issues (vertical dimension). The last column and row of the panel report differences in post-issue returns of nonlast and last issues in the sequence of offerings. Post-previous-issue return is the return in the fiscal year immediately following the year of the previous equity issuance. Post-issue return is the return in the fiscal year immediately following the year of the current issue. Number_of_Issues is the number of times the firm has issued equity after its IPO until it exits our sample. Offer_After_IPO is the chronological sequence number of the equity issue since the IPO. * and ** indicate values significantly different from 0 at the 5% and 1% levels, respectively.

Panel A. Frequency of Equity Issuance

	Post-Previous-Issue Return (PR(+1)) Quintiles					
Years from Previous Issue	1 (low)	2	3	4	5 (high)	5 – 1
1	0.029	0.043	0.057	0.074	0.183	0.154**
2	0.008	0.042	0.053	0.101	0.168	0.160**
3	0.024	0.064	0.038	0.037	0.069	0.045**
4	0.033	0.038	0.040	0.058	0.062	0.029
5	0.033	0.033	0.048	0.028	0.078	0.046*
6	0.034	0.022	0.022	0.053	0.043	0.009
7+	0.034	0.020	0.029	0.023	0.022	–0.012
Equity issues	965					
All firm-years	20,178					

Panel B. Post-Issue Returns

	Offer_After_IPO				Last – Nonlast Issues
Number_of_Issues	1	2	3	Last	
1	–0.127**				–0.253**
2	0.187**	–0.066**			–0.229**
3	0.237**	0.118*	–0.050		–0.155**
4+	0.005	0.102*	0.273**	–0.016	
Last – Nonlast Issues	–0.300**	–0.178**	–0.323**	–0.241*	

tile issue again. In contrast, only 2.9% of firms from the bottom PR(+1) quintile issue in the first year after the issue. These results are not too surprising, given the finding from the earlier literature that equity issues tend to follow periods of high returns. More interestingly, however, the effect of post-issue returns on the firms' propensity to issue equity again is lasting. Firms from the top PR(+1) quintile demonstrate an increased propensity to issue equity for up to 5 years after

the equity issue.[12] These findings are consistent with market feedback, although alternative explanations cannot be ruled out at this point.

B. Controlling for Total Number of Issues

The results in Panel A of Table 2 suggest that a higher post-issue return may make a firm more likely to issue again in the future. However, the observed positive relation between post-issue returns and the probability of follow-on equity issuance could also arise if firms issuing equity repeatedly were the type of firms more likely to experience higher post-issue returns than firms that have issued equity only once.

In Panel B of Table 2 we examine the post-issue stock returns conditional on Number_of_Issues, defined as the total number of times a firm has issued equity by the time it exited our sample, and on Offer_After_IPO, defined as the sequential number of the seasoned equity issue in the series of issues by the same firm.[13] This approach allows us to examine differences across firms that have issued equity a different number of times and across the sequence of issues. The last row in the panel reports the differences in post-issue market performance of last and nonlast issues in our sample, holding the Offer_After_IPO constant. The last column in the panel reports the differences in post-issue market performance of last and nonlast issues, holding the Number_of_Issues constant.

The results show that the average post-issue returns are negative only for the last issue in the sequence. Negative post-issue performance is observed for the first issues by firms that issue only once, for the second issues by firms that issue twice, for the third issues by firms that issue 3 times, and so on. The post-issue returns for issues that are followed by other issues are positive, in most cases significantly.

The results in the last column and the last row of Panel B of Table 2 confirm that the post-issue performance of the issues that are followed by other issues is economically and statistically significantly higher than the performance of the one-time issuers or the performance following the last issue in the sequence. For example, for firms with 3 equity issues, the mean post-third-issue return is 22.9 percentage points lower than the mean return after the first 2 issues. Similarly, the post-first-issue return of firms that issue equity only once is 30.0 percentage points lower than the post-first-issue returns of firms that issue multiple times. Overall, these results confirm that firms with good post-issue performance are more likely to raise equity again.

C. Potential Biases

If most of the last issues are concentrated at the end of the sample period, the negative post-issue returns may be driven by the specific market conditions at that time. We therefore repeat our analysis excluding the last 5 and, alternatively,

[12]The differences in the last column of Panel A of Table 2 are statistically significant at 1% for years 1–3, at 10% for year 4, and at 5% for year 5.

[13]The Offer_After_IPO variable, provided by the SDC New Issues database, tracks the number of equity issues since the IPO.

the last 10 years of data. In each case the results remain qualitatively the same. It is also possible that the results in Table 2 are driven by survivor bias. Firms experiencing negative returns after equity issuance could have a higher likelihood of dropping out of the Compustat sample due to, for example, bankruptcy or takeover and therefore never issue equity again. We repeat our analysis for firms with at least 5 and, alternatively, at least 10 annual observations after the last instance of issuing equity. The results do not change.

To summarize, the preliminary analysis in this section suggests that higher returns in the year after an equity issue are associated with a higher probability of follow-on equity issuance. This is consistent with the market feedback hypothesis that views high post-issue returns as a signal that the market believes that the marginal return to the project is high, which, in turn, encourages managers to increase the scale of a project by raising additional capital. In the remaining sections of the paper, we develop evidence that allows us to distinguish this hypothesis from other alternatives.

IV. Post-Issue Market Performance and Follow-On Equity Issuance: Controlling for Other Factors

A. Controlling for Follow-On Issue Characteristics

The positive effect of the post-previous-issue return, PR(+1), documented in the previous section, could arise if it were correlated with factors known to affect the probability of equity issuance. For example, it has been established in the earlier literature and confirmed in Table 1 that the probability of equity issuance in year t increases with the return in year $t-1$, RETURN(–1). It is possible that post-previous-issue return, PR(+1), is important in the univariate sense simply because it is positively correlated with RETURN(–1). This may happen, for example, if consecutive issues quickly follow each other, creating overlaps in the time periods over which the 2 returns are measured.

In this section we reexamine the relation between post-previous-issue returns, PR(+1), and the probability of equity issuance with comprehensive controls for differences in other firm characteristics using a logit regression of the following form:

$$(1) \quad E_{it}^{*} = \gamma X_{it-1} + \beta_1 \mathrm{PR}(+1)_{it} \times \mathrm{D2}_{it} + \beta_2 \mathrm{PR}(+1)_{it} \times \mathrm{D5}_{it} + \beta_3 \mathrm{PR}(+1)_{it} \times \mathrm{DN5}_{it} + \beta_4 \mathrm{D2}_{it} + \beta_5 \mathrm{D5}_{it} + \beta_6 \mathrm{DN5}_{it} + \varepsilon_{it}.$$

In equation (1), E^{*} is a latent variable measuring the propensity to issue equity in the current period, t. Its observable binary counterpart, E, is set to 1 for observations with equity issues and 0 otherwise. Here, X is a vector of independent variables capturing crucial firm and industry characteristics suggested by theory and found important in prior studies, including year indicators to control for macroeconomic and market-wide effects. Since our previous evidence indicates that the effect weakens with the time passed since the previous equity issue, we interact the post-previous-issue return, PR(+1), with 3 indicator variables (D2, D5, DN5).

This allows us to examine the effects of post-previous-issue return conditional on whether the previous issue was within the previous 2 years (D2 = 1), within the previous 3–5 years (D5 = 1), or more than 5 years prior (DN5 = 1).[14]

The estimation results are presented in Table 3. The reported statistics in this and all subsequent tables reflect robust standard errors adjusted for heteroskedasticity and firm-level clustering.[15] Consistent with our findings in Table 2, the effect of post-previous-issue return is statistically significant for observations within 5 years of the previous issue (D2 = 1 or D5 = 1) and is insignificant for observations that are 6 or more years after the previous issue (DN5 = 1). Our calculations using marginal effects show that, for a firm with average values of firm characteristics, a 1-standard-deviation increase in post-previous-issue return increases the probability of equity issuance by 1 percentage point if the previous issue was within the last 2 years, and by 0.4 percentage points if the previous issue was within the last 5 years. Given that the unconditional probability of equity issuance in our sample is 4.5%, these effects can be considered economically significant.

Thus, the effect of PR(+1) survives in the presence of traditional controls for equity issue timing and mispricing, which are also significant in Table 3. Specifically, the positive effects of RETURN(–1) and industry-adjusted MB imply that firms are more likely to issue equity following periods of high returns and when they are valued at premium relative to their industry peers.[16] The effects of these variables are somewhat stronger than the effects of market feedback. Specifically, a 1-standard-deviation increase in the pre-issue return, RETURN(–1), increases the probability of equity issuance by 5 percentage points, whereas a 1-standard-deviation increase in industry-adjusted MB increases the likelihood of equity issuance by 1.2 percentage points.

Other results are also consistent with prior literature. We find that equity issuers tend to have higher leverage, have higher research and development (R&D) intensity, and be smaller than nonissuers.[17] Other factors being equal, higher leverage implies higher probability of being overlevered and therefore is expected to have a positive effect on the probability of equity issuance. On the other hand, the effect of industry average leverage, which we use as a proxy for target leverage, is insignificant. The positive effect of R&D is consistent with the view that firms with high growth opportunities and product uniqueness should keep their

[14]The number of years between the issues is computed relative to the most recent issue. For example, if a firm had an equity issue in 1997 and another in 1999, the second issue will stop the count on the number of years between them. So years 3–5 relative to issue in 1997 will instead be years 1–3 relative to issue in 1999.

[15]These robust standard errors are based on the clustering generalization of the Huber (1967) and White (1980) "sandwich" estimator, as in Froot (1989), Rogers (1993), and Williams (2000).

[16]These results are consistent with numerous studies that report that high stock returns and MB ratios significantly increase the probability of equity issuance vis-à-vis no issuance (Kamstra, Nandy, and Shao (2008)) and debt issuance (e.g., Hovakimian, Opler, and Titman (2001), Dittmar and Thakor (2007)).

[17]Leverage is book leverage measured by the sum of short-term (Item 34) and long-term debt (Item 9) scaled by total assets (Item 6). R&D intensity is Item 46 scaled by net sales (Item 12). SIZE is measured as the market value of equity.

TABLE 3

Post-Issue Returns and Follow-On Equity Issuance

Table 3 reports the results of a logit regression estimating the probability of an equity issue for a sample of firms with at least 1 prior seasoned equity issuance. The dependent variable is coded 1 if a firm issues equity during the year and 0 if it does not. Leverage is (long-term debt + short-term debt)/total assets. Industry leverage ratio is the mean leverage for firms with the same 2-digit SIC code. Operating income (OI) is EBITDA scaled by total assets. Carryforwards is net operating loss carryforwards/total assets. R&D intensity is research and development expenses/sales. Tangibility is measured as net property, plant, and equipment/total assets. SIZE is the market value of equity. Offer_After_IPO is the chronological sequence number of the equity issue. The market-to-book (MB) ratio is (total assets – book value of common equity + market value of common equity)/total assets. Industry-adjusted MB ratio is (MB – industry mean MB)/MB, with industry defined based on 2-digit SIC code. RETURN(–1) is the return over the preceding year. PR(+1) is the post-previous-issue return defined as the return in the fiscal year immediately following the previous equity issue. D2 is an indicator variable set to 1 if the firm had an equity issue within the previous 2 years. D5 is an indicator variable set to 1 if the firm had an equity issue within 3–5 years prior. DN5 is an indicator variable set to 1 if the firm had no equity issue within the previous 5 years. All variables are for the fiscal year preceding the year of the issue. The regressions include year indicator variables that are not reported. The *z*-statistics reflect standard errors adjusted for heteroskedasticity and clustering. * and ** indicate values significantly different from 0 at the 5% and 1% levels, respectively.

Independent Variables	Coeff.	*z*-Stat.
Leverage	1.879**	7.1
Industry leverage	–1.260	–1.6
OI	0.843*	2.3
Carryforwards	–0.415*	–2.0
R&D intensity	1.301**	3.6
Tangibility	0.409	1.8
SIZE	–0.287**	–3.2
Offer_After_IPO	0.148**	3.5
MB	0.011	0.2
Industry-adjusted MB	0.851**	5.6
RETURN(–1)	0.770**	9.5
PR(+1) × D2	0.848**	7.2
PR(+1) × D5	0.364*	2.0
PR(+1) × DN5	0.064	0.4
D2	–4.306**	–3.7
D5	–4.429**	–3.8
DN5	–5.038**	–4.3
Pseudo R^2	0.157	
Equity issues	638	
No. of observations	13,604	

leverage low to avoid debt overhang and to maintain investment flexibility. Large and mature firms tend to have less volatile cash flows and enjoy access to relatively inexpensive debt, which makes them less reliant on equity financing.

The regression results also imply that firms issuing equity have higher operating income (OI) and lower net loss carryforwards.[18] The effect of asset tangibility is not significant in this regression.[19] The positive coefficient on Offer_After_IPO suggests that the probability of equity issuance is higher for firms with a history of issuing equity repeatedly. This may reflect unobserved heterogeneity between firms that exhibit dependence on external equity financing and those that do not.

The significance of PR(+1) in Table 3 is observed despite controlling for several measures of misvaluation at the time of equity issuance, such as the pre-issue return, MB, and industry-adjusted MB. Nevertheless, given the prominence of the misvaluation hypothesis in the literature on corporate financing decisions, we have experimented with estimating regression (1) using 2 other measures of

[18] OI is measured as earnings before interest, taxes, depreciation, and amortization (EBITDA) (Item 13)/lagged total assets (Item 6). Net operating loss carryforwards is Item 52/total assets.

[19] Asset tangibility is measured as net property, plant, and equipment (PPE) (Item 8)/total assets.

misvaluation. Specifically, we follow Lee, Myers, and Swaminathan (1999) and Ang and Cheng (2006), who use the residual income model in constructing the misvaluation measure. The misvaluation is measured relative to the fair value of the firm as determined by the combination of the initial book value and discounted future earnings. Similar to these studies, we use 2 proxies for future earnings: the analysts' consensus earnings forecasts from the Institutional Brokers' Estimate System (IBES) and the actual future (ex post) earnings. The discount rate is estimated as industry-level cost of equity using the Fama and French (1997) approach. The only qualitative difference from the results reported in Table 3 is the decline in the significance of PR(+1) $\times$ D5 to the 10% level when the analyst-forecasts-based measure of mispricing is used.[20]

In a recent paper, Campello and Graham (2007) argue that high stock prices affect corporate policies because they relax financing constraints. They show that during the 1995–1999 technology bubble, nontech firms were able to take advantage of overall high valuations in the equity markets by issuing equity and using the proceeds to increase their capital expenditures. They find this effect to be particularly strong among financially constrained firms.

To ensure that our results are not driven by these effects, we reestimate the equity issue model from Table 3 using 2 special subsamples. The first subsample excludes the tech bubble years (1995–1999). The second subsample excludes financially constrained firms, defined as firms in the bottom 3 deciles of the sample based on total assets. The decile assignments are made each year based on that year's distribution of values of total assets in our sample, as in Campello and Graham (2007). The estimation results (not reported for brevity) remain qualitatively similar to those reported in Table 3, not affecting our conclusion that high returns in the first post-issue year increase the likelihood of follow-on equity issuance in the next 5 years.

To summarize, the results in this section confirm that firms that experience superior post-issue performance are significantly more likely to return to the market for additional rounds of equity financing within the next 5 years. This result holds when we control for pre-issue returns as well as other firm and industry characteristics identified by earlier studies as important determinants of the equity issuance decision.

B. Controlling for Initial Issue Characteristics

The results in Table 3 show that the effect of post-issue return on the probability of follow-on equity issuance remains significantly positive when we control for firm characteristics observed at the time of the follow-on issue. The positive relation between the post-issue return and the probability of follow-on equity issuance could also arise if some factors associated with the current equity issue induce both a higher post-issue return and a higher probability of follow-on issuance.

For example, according to Teoh et al. (1998) and Rangan (1998), managers manipulate the market into becoming overoptimistic about the firm's prospects by inflating their earnings right before equity is issued. The market's overoptimism,

[20]These results are not reported for brevity but are available from the authors.

along with its failure to fully adjust for the information content of the equity issue announcement, allows the firm to issue new equity at an inflated share price. Subsequently, the share price declines over time, reflecting the market's disappointment with poor operating performance.

It is possible that firms expecting to issue again in the near future do not manage their earnings as aggressively as firms that do not expect to issue again. For example, managers may not want to inflate current earnings at the expense of future earnings, since that may negatively affect the future offer price. Less aggressive earnings management could explain the superior post-issue performance of firms with follow-on issues.

Another possibility is based on the premise that managers are asymmetrically better informed than the market about the firm value and that their inside information becomes public with delay. Under this hypothesis, managers do not manipulate the market but simply exploit their informational advantage over investors. Lucas and McDonald (1990) show that managers with favorable private information may postpone their equity issues until after the positive news is released. Extending this line of reasoning, if a firm with favorable private information experiences a liquidity shock forcing it to raise new equity, it may issue the least amount possible and defer the remainder of the financing for later issuance after the favorable information is released. In contrast, firms with unfavorable private information would increase the size of the issue so that they would not have to issue after the unfavorable information becomes public. Such behavior would be consistent with our finding that the probability of equity issuance increases with the post-previous-issue return.

We test whether the positive relation between the post-issue return and the probability of follow-on equity issuance is due to factors associated with the initial equity issue by estimating the following regression model:

$$(2)\quad E(+1,+5)^{*}_{it} = \gamma X_{it-1} + \beta_1 \mathrm{DCA}_{it-1} + \beta_2 \mathrm{NDCA}_{it-1} + \beta_3 \mathrm{CF}_{it-1} + \beta_4 \mathrm{Iss\_Size}_{it} + \beta_5 \mathrm{CAR}_{it} + \beta_6 \mathrm{RETURN}(+1)_{it} + \varepsilon_{it}.$$

Regression model (2) is estimated on a sample of observations with an equity issue in the current year, t. The dependent variable, $E(+1,+5)$, is set to 1 if the firm has a follow-on equity issue within the next 5 years and is set to 0 if it does not. Thus, regression model (2) uses the firm characteristics at the time of the current equity issue to predict whether there will be a follow-on issue within the next 5 years.

The set of independent variables in equation (2) includes most of the variables used in regression model (1) as reported in Table 3, with some modifications. First, we replace the post-previous-issue return, PR(+1), with the return in the first post-issue year, RETURN(+1). Since regression model (2) predicts the probability of follow-on issuance over the next 5 years, RETURN(+1) plays the same role as PR(+1) played in regression model (1). We also add the cumulative abnormal return (CAR) at the time of the issue announcement.[21] We include

[21] CARs are the market-adjusted returns measured over a 3-day period from day (–1) to day (+1) relative to the filing date with the market returns based on the CRSP value-weighted index.

it to examine whether, similar to 1-year post-issue returns, the market reaction at the time of the issue announcement serves as additional feedback and has a positive effect on the probability of follow-on issuance.

We also complement the independent variables with Iss_Size as well as measures of earnings management. As we discussed earlier, these variables capture managerial choices that could account for the positive relation between the post-issue return and the probability of follow-on issuance observed in our earlier tests.[22] Following Teoh et al. (1998), we use discretionary current accruals (DCA) as our measure of earnings management. Specifically, we decompose the pre-issue OI into 2 components: cash flows and current accruals.[23] We then further decompose current accruals into DCA and nondiscretionary current accruals (NDCA) using the following procedure: For each year and 2-digit SIC code, we estimate ordinary least squares (OLS) regressions of current accruals scaled by beginning-of-the-period total assets on the inverse of beginning assets and the change in sales scaled by beginning assets. The nondiscretionary component of current accruals, NDCA, is the predicted value of the accruals from this regression. The residual of the regression is the DCA. The discretionary component of accruals is more easily manipulated, while the nondiscretionary component is standard for a particular firm size, level of sales, and industry.

We estimate two versions of regression model (2). The first set of results in Table 4 is for a version with firm characteristics as of the last pre-issue year, $t - 1$. These characteristics allow us to control for factors that affected the initial equity issue decision, including its timing with respect to market conditions and the extent of pre-issue earnings management. Only 4 variables are significant. Firms with high pre-issue R&D tend to issue again in the future. The effect of SIZE is negative, implying that large firms are less likely to have a follow-on equity issue. The effect of Offer_After_IPO is positive, which suggests that firms with a history of equity issuance are more likely to issue again. The most likely reason for the significance of these variables is that they proxy for equity dependence.

Confirming our earlier findings, high post-issue stock return, RETURN(+1), is associated with an increased probability of follow-on issuance. In contrast, the announcement CAR has no significant impact, implying that the market reaction to the equity issuance announcement does not serve as feedback to the firm. This is in line with the hypothesis that the feedback is generated by the information produced by sophisticated investors after they learn about the SEO.

The managerial choice variables are insignificant. Earnings management at the time of the previous issue does not have an impact on follow-on equity issuance. Neither the discretionary nor the nondiscretionary accruals are significant. Iss_Size has no effect on the probability of subsequent equity issuance, which is not consistent with the hypothesis of market timing based on private

[22] Iss_Size is measured as the dollar value of the issue as reported in SDC scaled by total assets.

[23] Current accruals are defined as the change in [(current assets (Item 4) – cash (Item 1)) – (current liabilities (Item 5) – current maturity long-term debt (Item 44))]. Cash flow is defined as OI minus current accruals.

TABLE 4

Predicting Follow-On Equity Issuance Using Current Issue Characteristics

Table 4 reports results of 2 logit regressions estimating the probability of a follow-on equity issue using current issue characteristics. The dependent variable is coded 1 if a firm issues equity during the next 5 years and 0 if it does not. Leverage is (long-term debt + short-term debt)/total assets. Industry leverage is the mean leverage for firms in the same 2-digit SIC code. Carryforwards is net operating loss carryforwards/total assets. R&D intensity is research and development expenses/sales. Tangibility is measured as net property, plant, and equipment/total assets. SIZE is the market value of equity. Offer_After_IPO is the chronological sequence number of the equity issue. The market-to-book (MB) ratio is (total assets – book value of common equity + market value of common equity)/total assets. Industry-adjusted MB ratio is (MB – industry mean MB)/MB, with industry defined based on 2-digit SIC code. RETURN(–1) is the return over the preceding year. RETURN(+1) is the 1-year post-issue return. CAR is the cumulative abnormal issue announcement return (days –1 through +1). Iss_Size is ($ value of the issue)/total assets. Current accruals is the change in [(current assets – cash) – (current liabilities – current maturity long-term debt)]. Discretionary current accruals (DCA) is the residual of the OLS regression of current accruals scaled by beginning-of-the-period total assets on the inverse of beginning assets and the change in sales scaled by beginning assets, estimated separately for each year and 2-digit SIC code. Nondiscretionary current accruals (NDCA) is the predicted value of the accruals from this regression. CF is operating cash flow, defined as (EBITDA – current accruals)/total assets. All variables are for the fiscal year *T* relative to the year of the issue unless noted otherwise. The *z*-statistics reflect standard errors adjusted for heteroskedasticity and clustering. * and ** indicate values significantly different from 0 at the 5% and 1% levels, respectively.

	Pre-Current Issue ($T = -1$) Characteristics		Post-Current Issue ($T = +1$) Characteristics	
Independent Variables	Coeff.	*z*-Stat.	Coeff.	*z*-Stat.
Intercept	–1.768**	–4.0	–1.663**	–4.6
Leverage	–0.033	–0.1	–0.025	–0.1
Industry leverage	1.437	1.2	0.435	0.4
Carryforwards	–0.323	–1.3	–0.350	–1.4
R&D intensity	1.261*	2.2	0.331	0.6
Tangibility	0.330	0.8	0.813*	2.4
SIZE	–0.728*	–2.4	–0.000	–0.6
Offer_After_IPO	0.179**	3.1	0.027	0.5
MB	–0.109	–1.2	–0.091	–1.2
Industry-adjusted MB	0.412	1.7	0.796**	3.7
RETURN(–1)	–0.088	–0.8		
RETURN(+1)	1.161**	9.2	0.889**	7.1
CAR	0.164	0.1	0.231	0.2
Iss_Size	–0.070	–0.3	0.186	1.8
DCA	0.544	0.7	2.700**	3.7
NDCA	1.695	1.4	5.241**	3.7
CF	–0.163	–0.3	–0.148	–0.3
Pseudo R^2	0.088		0.098	
Follow-on issues	325		316	
No. of observations	1,441		1,963	

information. The pre-issue returns are also insignificant, implying that there is no difference in pre-equity-issue returns of firms with and without subsequent follow-on issues.

The issuance of equity, along with the use of its proceeds, has the potential to change the nature of the firm. By measuring the firm characteristics prior to the issue, we may have weakened the impact of the control variables reported in the first set of results in Table 4. We therefore reestimate regression model (2) with all firm characteristics measured as of the first year after the issue. The second set of results in Table 4 reflects the estimation outcome of this version of the model.

Some of the control variables become statistically significant in this specification. Specifically, higher post-issue accruals are associated with a higher probability of follow-on equity issuance, consistent with the view that firms do not engage in serious earnings management when they expect to issue equity multiple times. Importantly, however, the effect of post-issue returns (RETURN(+1))

remains significant.[24] The significance of RETURN(+1), while controlling for post-issue operating performance and other characteristics, suggests that the information provided by the market feedback cannot be otherwise obtained by observing these post-issue characteristics.

To summarize, consistent with the market feedback hypothesis, the positive relation between post-issue returns and the probability of follow-on equity issuance does not disappear when we control for previous issue characteristics, including variables related to managerial private information and earnings management.

V. Further Evidence on Market Feedback

As we have shown in the previous section, the introduction of various controls does not change our basic finding that high post-equity-issue returns are associated with increased probability of follow-on equity issuance, consistent with the market feedback hypothesis. In this section we pursue a different identification strategy. Instead of introducing various control variables, we examine how feedback affects other corporate financing and investment decisions and explore the nature of the market feedback mechanism.

A. Market Feedback and Investment

If the market feedback interpretation of our results is correct, then firms with higher post-issue returns should exhibit higher rates of investment in following years. We test this hypothesis by estimating regressions of investment on the indicator variables D2 and D5, along with their interactions with post-previous-issue returns, PR(+1). We also include control variables for growth opportunities, measured by MB, and availability of internal funds, measured by OI, as prior research has shown these to be important determinants of corporate investment (Fazzari, Hubbard, and Petersen (1988)).

$$\begin{aligned}(3)\quad \text{INVESTMENT}_{it} \;=\; & \beta_0 + \beta_1 \text{MB}_{it-1} + \beta_2 \text{OI}_{it} + \beta_3 \text{D2} + \beta_4 \text{D2} \times \text{PR}(+1) \\ & + \beta_5 \text{D5} + \beta_6 \text{D5} \times \text{PR}(+1) + \beta_7 \text{DN5} \\ & + \beta_8 \text{DN5} \times \text{PR}(+1) + \varepsilon_{it}.\end{aligned}$$

Table 5 presents the estimation results for 3 versions of regression model (3). The first set of results is for the version with capital investment as the dependent variable in equation (3).[25] Consistent with previous studies of determinants of corporate investment, capital expenditures increase with both MB ratio and OI. The coefficient estimates on the interaction terms D2 $\times$ PR(+1) and D5 $\times$ PR(+1) are also significantly positive, implying that capital expenditures increase with the

[24] It is possible that earnings management does not affect market feedback because investors and markets are not fooled by earnings management (see Coles, Hertzel, and Kalpathy (2006)).

[25] Capital investment is measured as change in PPE (Item 8), scaled by the beginning-of-the-year total assets.

post-previous-issue return. The second and third sets of results are for regressions of R&D expenses and advertising expenses, respectively.[26] The interaction terms D2 × PR(+1) and D5 × PR(+1) are insignificant in these regressions.

TABLE 5

Post-Issue Returns and Investment

Table 5 reports fixed firm effects regressions estimating the determinants of corporate investment. Capital investment is capital expenditures scaled by beginning-of-the-year total assets. R&D is research and development expenses, scaled by net sales. Advertising is advertising expenses scaled by net sales. The market-to-book (MB) ratio is ((total assets – book value of common equity + market value of common equity)/total assets) measured at the beginning of the year. Operating income (OI) is EBITDA scaled by beginning-of-the-year total assets. PR(+1) is the post-previous-issue return defined as the return in the fiscal year immediately following the previous equity issue. D2 is an indicator variable set to 1 if the firm had an equity issue within the last 2 years. D5 is an indicator variable set to 1 if the firm had an equity issue within the last 3–5 years. DN5 is an indicator variable set to 1 if the firm did not have an equity issue in the last 5 years. The regressions include year indicator variables that are not reported. The *t*-statistics reflect standard errors adjusted for heteroskedasticity and clustering. * and ** indicate values significantly different from 0 at the 5% and 1% levels, respectively.

	Capital Investment		R&D		Advertising	
Independent Variables	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.
MB	0.011**	10.1	0.037**	14.0	0.004**	2.6
OI	0.210**	20.0	–0.473**	–16.7	–0.036**	–2.7
D2	0.016**	4.2	0.144**	14.9	0.024**	5.2
D5	–0.027**	–7.6	0.137**	15.2	0.025**	6.0
DN5	–0.040	–13.5	0.112**	13.3	0.024**	7.2
PR(+1) × D2	0.031**	5.8	0.008	1.0	–0.003	–1.0
PR(+1) × D5	0.010*	2.6	–0.009	–1.2	–0.004	–1.4
PR(+1) × DN5	0.005	0.9	–0.001	–0.1	–0.003	–0.9
R^2	0.204		0.534		0.348	
No. of obs.	19,236		9,552		7,075	

These results are interesting and allow us to distinguish the market feedback hypothesis from an alternative "equity financing channel" hypothesis. The positive effect of PR(+1) on capital expenditures is consistent with the market feedback hypothesis, but it can also arise if high post-issue returns reduce the cost of external equity, leading to follow-on equity issuance and more investment.[27] Based on this "equity financing channel" hypothesis, however, we would expect the impact of PR(+1) on R&D and advertising to be significant as well. After all, availability of additional funds due to cheap external equity should allow the firm to increase its spending across the board. The insignificance of PR(+1) in R&D and advertising regressions is inconsistent with the "equity financing channel" hypothesis.

We would argue, however, that the selective impact of post-issue returns is consistent with the market feedback hypothesis. Specifically, the feedback hypothesis is based on a premise that the market has certain information that the managers do not have. In the case of capital investment, the feedback could be about the demand for a particular product, for example. In the case of R&D, it

[26] Advertising is Item 45, scaled by net sales (Item 12).

[27] This "equity financing channel" hypothesis has a long history in economics, with contributions from Keynes (1936), Fischer and Merton (1984), Stein (1996), and Baker, Stein, and Wurgler (2003), among others.

seems more likely that most of the information relevant for making decisions about follow-on R&D investment would be generated within the firm. For example, in the case of pharmaceutical research, the success or failure of the earlier stages of drug development and testing determines whether the R&D will move on to the next stage. Investors are unlikely to have valuable information that would affect this decision-making process. Similar arguments can be made about advertising, as firms may have to spend more to advertise products and services whose benefits are not known to the market.

B. Market Feedback and Follow-On Debt Issuance

In this subsection we examine the impact of market feedback on follow-on debt issuance. If the feedback is about the investment policy of the firm, then we should not expect its impact to be limited to follow-on equity issuance. The likelihood of follow-on debt issuance also should increase in response to positive feedback. In contrast, if the importance of post-equity-issue returns only reflects corporate attempts to sell overvalued equity, then we should not find a positive relation between the post-equity-issue return and the likelihood of debt issuance.

Table 6 reports the results of estimation of regression model (1) with a debt issuance indicator as the dependent variable.[28] The significantly positive coefficient estimates on PR(+1) $\times$ D2 and PR(+1) $\times$ D5 indicate that high post-equity-issue returns are associated with increased likelihood of follow-on debt issuance for up to 5 years after the equity issue. These results are consistent with the hypothesis that firms respond to market feedback about their investment opportunities.

C. Idiosyncratic versus Systematic Returns

If the market feedback is about the investment projects of the firm, then the post-issue return effect should be confined to the firm-specific component of the return, while market-wide movements in stock prices should be less informative and therefore their impact should be insignificant. To test this hypothesis, we reestimate regression equation (2) with post-previous-issue return split into 2 components. The first component is the benchmark return on the matching book-to-market and size portfolio we used earlier to calculate abnormal post-issue returns. The second component is the firm-specific abnormal portion of the return. The first set of results presented in Table 7 is consistent with our hypothesis. The effect of the abnormal portion of the post-previous-issue return is positive and statistically significant. The effect of the matching portfolio return is insignificant.

In the above analysis, the matching benchmark returns are calculated using pre-issue characteristics of the equity-issuing firms. Equity issues may result in changes in the nature of the firm, potentially biasing our matching procedure.

[28]The data on debt issuance come from Thomson Financial's SDC new issues database. Our sample includes issues of convertible and nonconvertible public, private, and Rule 144 debt.

TABLE 6

Post-Issue Returns and Follow-On Debt Issuance

Table 6 reports the results of a logit regression estimating the probability of a debt issue for a sample of firms with at least 1 prior seasoned equity issuance. The dependent variable is coded 1 if a firm issues debt during the year and 0 if it does not. Leverage is (long-term debt + short-term debt)/total assets. Industry leverage ratio is the mean leverage for firms with the same 2-digit SIC code. Operating income (OI) is EBITDA scaled by total assets. Carryforwards is net operating loss carryforwards/total assets. R&D intensity is research and development expenses/sales. Tangibility is measured as net property, plant, and equipment/total assets. SIZE is the market value of equity. Offer_After_IPO is the chronological sequence number of the equity issue. The market-to-book (MB) ratio is (total assets – book value of common equity + market value of common equity)/total assets. Industry-adjusted MB ratio is the (MB – industry mean MB)/MB, with industry defined based on 2-digit SIC code. RETURN(–1) is the return over the preceding year. PR(+1) is the post-previous-issue return, defined as the return in the fiscal year immediately following the previous equity issue. D2 is an indicator variable set to 1 if the firm had an equity issue within the previous 2 years. D5 is an indicator variable set to 1 if the firm had an equity issue within 3–5 years prior. DN5 is an indicator variable set to 1 if the firm had no equity issue within the previous 5 years. All variables are for the fiscal year preceding the year of the issue. The regressions include year indicator variables that are not reported. The *z*-statistics reflect standard errors adjusted for heteroskedasticity and clustering. * and ** indicate values significantly different from 0 at the 5% and 1% levels, respectively.

Independent Variables	Coeff.	*z*-Stat.
Leverage	2.237**	9.9
Industry leverage	1.887**	2.7
OI	1.172**	3.2
Carryforwards	–0.610**	–2.7
R&D intensity	1.136**	2.7
Tangibility	0.838**	4.1
SIZE	0.231**	9.3
Offer_After_IPO	0.211**	5.3
MB	–0.219**	–3.2
Industry-adjusted MB	0.227	1.7
RETURN(–1)	0.238**	3.5
PR(+1) × D2	0.414**	4.6
PR(+1) × D5	0.457**	4.1
PR(+1) × DN5	0.305	1.9
D2	–3.877**	–4.9
D5	–4.151**	–5.2
DN5	–5.038**	–6.4
Pseudo R^2	0.136	
Debt issues	1,201	
No. of observations	13,604	

We therefore repeat the analysis using matching based on post-issue firm characteristics. The second set of results in Table 7 shows that this experiment does not change our conclusions.

D. Institutional Investment and Equity Issuance

Our focus on the market feedback in response to SEOs is motivated by the hypothesis that SEOs induce sophisticated investors to intensify the production of information about the issuing firm. By trading on that information, investors generate market feedback in the process. To test whether the intensity of trading by institutional investors is higher around an SEO, we examine changes in institutional ownership around an SEO using the following regression model:[29]

$$(4)\quad \Delta\mathrm{INST}(-1,+1)_{it} = \beta_{0t} + \beta_1 \mathrm{SEO}_{it} + \beta_2 \mathrm{Last\_SEO}_{it} + \beta_3 \mathrm{RETURN}(0)_{it} + \beta_4 \mathrm{RETURN}(-1)_{it} + \varepsilon_{it}.$$

[29]The institutional ownership data are collected from Compact Disclosure and cover the period from 1988 to 1999.

TABLE 7

Firm-Specific (Abnormal) Post-Issue Returns and Follow-On Equity Issuance

Table 7 reports results of 2 logit regressions estimating the probability of equity issuance for a sample of firms with at least 1 prior equity issue. The dependent variable is coded 1 if a firm issues equity during the year and 0 if it does not. Leverage is (long-term debt + short-term debt)/total assets. Industry leverage is the mean leverage for firms with the same 2-digit SIC code. Operating income (OI) is EBITDA scaled by total assets. Carryforwards is net operating loss carryforwards/total assets. R&D intensity is research and development expenses/sales. Tangibility is measured as net property, plant, and equipment/total assets. SIZE is the market value of equity. Offer_After_IPO is the chronological sequence number of the equity issue. The market-to-book (MB) ratio is (total assets – book value of common equity + market value of common equity)/total assets. Industry-adjusted MB ratio is (MB – industry mean MB)/MB, with industry defined based on 2-digit SIC code. RETURN(–1) is the return over the preceding year. PR(+1) is the post-previous-issue return, defined as the return in the fiscal year immediately following the previous equity issuance. Abnormal PR(+1) is the abnormal 1-year post-issue return relative to the matching portfolio return. In Specification (1), matching PR(+1) is the 1-year return on a portfolio of nonissuers, matched based on pre-previous-issue MB and size. In Specification (2), matching PR(+1) is the 1-year return on a portfolio of nonissuers, matched based on post-previous-issue MB and size. All other variables are for the fiscal year preceding the year of the current issue. The regressions include year indicator variables that are not reported. The *z*-statistics reflect standard errors adjusted for heteroskedasticity and clustering. * and ** indicate values significantly different from 0 at the 5% and 1% levels, respectively.

	(1)		(2)	
Independent Variables	Coeff.	*z*-Stat.	Coeff.	*z*-Stat.
Intercept	–4.369**	–9.7	–4.424**	–9.8
Leverage	1.844**	6.2	1.858**	6.2
Industry leverage	–1.327	–1.4	–1.187	–1.3
OI	0.749	1.8	0.702	1.7
Carryforwards	–0.269	–1.3	–0.302	–1.5
R&D intensity	1.116*	2.4	1.289**	3.1
Tangibility	0.284	1.1	0.256	1.0
SIZE	–0.317**	–3.3	–0.303**	–3.2
Offer_After_IPO	0.166**	3.7	0.158	3.4
MB	–0.056	–0.9	–0.055	–0.8
Industry-adjusted MB	0.977**	5.6	0.971**	5.6
RETURN(–1)	0.778**	10.3	0.774**	10.3
Abnormal PR(+1)	0.680**	6.6	0.628**	6.4
Matching PR(+1)	0.256	1.3	0.220	0.9
Pseudo R^2	0.138		0.138	
Equity issues	537		542	
No. of observations	10,957		11,034	

In equation (4), ΔINST(–1,+1) is the change in institutional ownership between years –1 and +1 relative to the current year, *t*. SEO is an indicator variable set to 1 if there is an SEO in the current year. Last_SEO is an indicator variable set to 1 if there are no follow-on equity issues by the same firm in the remaining years of our sample. RETURN(0) is the stock return in the year of the issue, *t*. RETURN(–1) is the stock return in the year before the issue. The last 2 variables are included to control for the possibility that a spurious relation arises between an SEO and changes in institutional ownership because both are affected by stock returns.

The estimation results for regression equation (4) are reported in the first 2 columns of Table 8. The results show that, on average, changes in institutional ownership around SEOs are not significantly different from changes when there are no SEOs. For the last issue, however, changes in institutional ownership are significantly more negative, suggesting that increases in institutional ownership may be associated with an increased probability of follow-on equity issuance.

Since the information generated by institutions in response to an SEO may be positive or negative, the institutional ownership could go up or down following

TABLE 8

Institutional Ownership around SEOs

Table 8 reports OLS regressions estimating the determinants of institutional ownership around SEOs. The dependent variable ΔINST(–1,+1) is the change in institutional ownership between years –1 and +1 relative to the current year. SEO is an indicator variable set to 1 if there is an SEO in the current year. Last_SEO is an indicator variable set to 1 if there are no follow-on equity issues by the same firm while it remains in our sample. RETURN(0) is the stock return in the year of the issue. RETURN(–1) is the stock return in the year before the issue. The regressions include year indicator variables that are not reported. The *t*-statistics reflect standard errors adjusted for heteroskedasticity and clustering. * and ** indicate values significantly different from 0 at the 5% and 1% levels, respectively.

	ΔINST(–1,+1)		|ΔINST(–1,+1)|	
Independent Variables	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.
Intercept	0.008	1.4	0.063**	13.5
SEO	–0.001	–0.1	0.052**	6.3
Last_SEO	–0.033*	–2.2	–0.025*	–2.5
RETURN(0)	–0.002	–0.7	0.009**	5.5
RETURN(–1)	–0.003	–1.3	0.008**	5.1
R^2	0.008		0.023	
No. of obs.	19,934		19,934	

an SEO. Although our results imply that, on average, the changes in ownership around SEOs are not unusual, the intensity of rebalancing (whether up or down) may still be abnormally high.

The second set of results in Table 8 is for the version of regression (4) with the absolute change in institutional ownership as the dependent variable. This specification allows us to test whether SEOs induce more intense rebalancing of institutional ownership levels (regardless of the direction) around SEOs. The results imply stronger rebalancing of institutional ownership in response to SEOs. The differences are significant both statistically and economically. The average absolute change in institutional ownership is more than 80% higher around SEOs. These changes are consistent with the hypothesis that information-generating activities intensify at the time of an SEO. The significantly negative coefficient estimate for the Last_SEO indicator suggests that the probability of follow-on issuance tends to be higher when institutions change their ownership positions.

To test how changes in institutional ownership affect the probability of follow-on equity issuance while controlling for other relevant factors, we estimate a version of regression model (2), augmented by the change in institutional ownership, ΔINST(–1, +1), as an additional independent variable. The significantly positive coefficient estimate in Table 9 implies that the probability of follow-on equity issuance increases with the change in institutional ownership observed at the time of the initial equity issue.

To summarize, our results imply that SEOs are characterized by more intense rebalancing of institutional ownership levels and that the direction of the change in institutional ownership at the time of an SEO is an important factor predicting whether the firm will return to the market for another round of equity financing. Since information production and trading by institutional investors in response to an SEO represent a mechanism by which market feedback may be generated, these results provide additional support for the importance of the feedback.

TABLE 9

Changes in Institutional Ownership and Follow-On Equity Issuance

Table 9 reports the results of logit regressions estimating the probability of equity issuance for a sample of firms with at least 1 prior seasoned equity issue. The dependent variable is coded 1 if a firm issues equity in the next 5 years and 0 if it does not. ΔINST(–1,+1) is the change in institutional ownership between years –1 and +1 relative to the current year. Leverage is (long-term debt + short-term debt)/total assets. Industry leverage is the mean leverage for firms with the same 2-digit SIC code. Carryforwards is net operating loss carryforwards/total assets. R&D intensity is research and development expenses/sales. Tangibility is measured as net property, plant, and equipment/total assets. SIZE is the market value of equity. Offer_After_IPO is the chronological sequence number of the equity issue. The market-to-book (MB) ratio is (total assets – book value of common equity + market value of common equity)/total assets. Industry-adjusted MB ratio is the (MB – industry mean MB)/MB, with industry defined based on 2-digit SIC code. RETURN(–1) is the return over the preceding year. RETURN(+1) is the post-issue return, defined as the return in the fiscal year immediately following the equity issue. CAR is the cumulative abnormal announcement return of the equity issue (days –1 through +1). Iss_Size is the dollar value of the issue scaled by total assets. CF is operating cash flow defined as (EBITDA – current accruals)/total assets. Current accruals is the change in [(current assets – cash) – (current liabilities – current maturity long-term debt)]. Discretionary current accruals (DCA) is the residual of the OLS regression of current accruals scaled by beginning-of-the-period total assets on the inverse of beginning assets and the change in sales scaled by beginning assets, estimated separately for each year and 2-digit SIC code. Nondiscretionary current accruals (NDCA) is the predicted value of the accruals from this regression. All variables are for the fiscal year preceding the year of the issue unless specified otherwise. The *z*-statistics reflect standard errors adjusted for heteroskedasticity and clustering. * and ** indicate values significantly different from 0 at the 5% and 1% levels, respectively.

Independent Variables	Coeff.	*z*-Stat.
Intercept	–0.068	–0.1
ΔINST(–1,+1)	1.896*	2.4
Leverage	0.193	0.3
Industry leverage	–1.900	–0.9
Carryforwards	–0.320	–0.8
R&D intensity	0.485	0.4
Tangibility	0.601	1.0
SIZE	–0.907*	–2.3
Offer_After_IPO	0.138	1.4
MB	–0.270	–1.5
Industry-adjusted MB	0.727	1.7
RETURN(–1)	–0.387	–1.8
RETURN(+1)	1.138**	4.9
CAR	2.103	1.0
Iss_Size	–0.543	–1.3
DCA	0.534	0.4
NDCA	2.190	1.0
CF	0.451	0.4
Pseudo R^2	0.132	
Follow-on issues	133	
No. of observations	491	

VI. Conclusions

We find that firms with high post-equity-issue returns are significantly more likely to return to the market for additional rounds of equity financing within the next 5 years. Introduction of various controls for factors known to affect the probability of equity issuance, including market timing, does not change this basic result.

Further analysis implies that these findings are most consistent with the market feedback hypothesis. Managers interpret high post-issue returns to imply that, in the market's view, the marginal return to the project is high, and they therefore raise additional debt and equity capital to increase the firm's capital investment.

We find additional support for the market feedback mechanism based on information gathering by institutional investors. The rebalancing of institutional holdings is unusually high around SEOs, and increases in institutional ownership are associated with a higher likelihood of a follow-on offering.

References

Alderson, M. J., and B. L. Betker. "The Long-Run Performance of Companies that Withdraw Seasoned Equity Offerings." *Journal of Financial Research*, 23 (2000), 157–178.

Allen, F., and G. R. Faulhaber. "Signaling by Underpricing in the IPO Market." *Journal of Financial Economics*, 23 (1989), 303–323.

Almazan, A.; J. Suarez; and S. Titman. "Firms' Stakeholders and the Costs of Transparency." *Journal of Economics and Management Strategy*, 18 (2009), 871–900.

Ang, J. S., and Y. Cheng. "Direct Evidence on the Market-Driven Acquisition Theory." *Journal of Financial Research*, 29 (2006), 199–216.

Baker, M.; J. C. Stein; and J. Wurgler. "When Does the Market Matter? Stock Prices and the Investment of Equity-Dependent Firms." *Quarterly Journal of Economics*, 118 (2003), 969–1005.

Baker, M., and J. Wurgler. "Market Timing and Capital Structure." *Journal of Finance*, 57 (2002), 1–32.

Campello, M., and J. Graham. "Do Stock Prices Influence Corporate Decisions? Evidence from the Technology Bubble." Working Paper, University of Illinois at Urbana-Champaign and Duke University (2007).

Chemmanur, T. J.; S. He; and G. Hu. "The Role of Institutional Investors in Seasoned Equity Offerings." *Journal of Financial Economics*, 94 (2009), 384–411.

Chemmanur, T. J., and Y. Jiao. "Institutional Trading, Information Production, and the SEO Discount: A Model of Seasoned Equity Offerings." *Journal of Economics and Management Strategy*, forthcoming (2010).

Choe, H.; R. W. Masulis; and V. Nanda. "Common Stock Offerings across the Business Cycle: Theory and Evidence." *Journal of Empirical Finance*, 1 (1993), 3–31.

Clarke, J.; C. Dunbar; and K. M. Kahle. "Long-Run Performance and Insider Trading in Completed and Canceled Seasoned Equity Offerings." *Journal of Financial and Quantitative Analysis*, 36 (2001), 415–430.

Coles, J. L.; M. Hertzel; and S. Kalpathy. "Earnings Management around Employee Stock Option Reissues." *Journal of Accounting and Economics*, 41 (2006), 173–200.

Dittmar, A., and A. Thakor. "Why Do Firms Issue Equity?" *Journal of Finance*, 62 (2007), 1–54.

Easterbrook, F. H. "Two Agency-Cost Explanations of Dividends." *American Economic Review*, 74 (1984), 650–659.

Fama, E. F., and K. R. French. "Industry Costs of Equity." *Journal of Financial Economics*, 43 (1997), 153–193.

Fazzari, S. M.; R. G. Hubbard; and B. C. Petersen. "Financing Constraints and Corporate Investment." *Brookings Papers on Economic Activity* (1988), 141–195.

Fischer, S., and R. C. Merton. "Macroeconomics and Finance: The Role of the Stock Market." *Carnegie-Rochester Conference Series on Public Policy*, 21 (1984), 57–108.

Froot, K. A. "Consistent Covariance Matrix Estimation with Cross-Sectional Dependence and Heteroskedasticity in Financial Data." *Journal of Financial and Quantitative Analysis*, 24 (1989), 333–355.

Fulghieri, P., and D. Lukin. "Information Production, Dilution Costs, and Optimal Security Design." *Journal of Financial Economics*, 61 (2001), 3–42.

Gibson, S.; A. Safieddine; and R. Sonti. "Smart Investments by Smart Money: Evidence from Seasoned Equity Offerings." *Journal of Financial Economics*, 72 (2004), 581–604.

Habib, M. A.; D. B. Johnsen; and N. Y. Naik. "Spinoffs and Information." *Journal of Financial Intermediation*, 6 (1997), 153–176.

Hill, P., and D. Hillier. "Market Feedback, Investment Constraints, and Managerial Behavior." *European Financial Management*, 15 (2009), 584–605.

Hovakimian, A. "Are Observed Capital Structures Determined by Equity Market Timing?" *Journal of Financial and Quantitative Analysis*, 41 (2006), 221–243.

Hovakimian, A.; T. Opler; and S. Titman. "The Debt-Equity Choice." *Journal of Financial and Quantitative Analysis*, 36 (2001), 1–24.

Huber, P. J. "The Behavior of Maximum Likelihood Estimates under Non-Standard Conditions." *Proceedings of the Fifth Berkeley Symposium on Mathematical Statistics and Probability.* Berkeley, CA: University of California Press, 1 (1967), 221–233

Jegadeesh, N. "Long-Term Performance of Seasoned Equity Offerings: Benchmark Errors and Biases in Expectations." *Financial Management*, 29 (2000), 5–30.

Jegadeesh, N.; M. Weinstein; and I. Welch. "An Empirical Investigation of IPO Returns and Subsequent Equity Offerings." *Journal of Financial Economics*, 34 (1993), 153–175.

Kamstra, M.; D. Nandy; and P. Shao. "Do Financing Expectations Affect Firm Performance?" Working Paper, York University and University of Northern British Columbia (2008).

Keynes, J. M. *The General Theory of Employment, Interest, and Money.* London, UK: Macmillan (1936).
Lee, C. M. C.; J. Myers; and B. Swaminathan. "What is the Intrinsic Value of the Dow?" *Journal of Finance*, 54 (1999), 1693–1741.
Lucas, D. J., and R. L. McDonald. "Equity Issues and Stock Price Dynamics." *Journal of Finance*, 45 (1990), 1019–1043.
Mikkelson, W. H., and M. M. Partch. "Withdrawn Security Offerings." *Journal of Financial and Quantitative Analysis*, 23 (1988), 119–133.
Purnanandam, A. K., and B. Swaminathan. "Do Stock Prices Underreact to SEO Announcements? Evidence from SEO Valuation." Working Paper, University of Michigan and Cornell University (2006).
Rangan, S. "Earnings Management and the Performance of Seasoned Equity Offerings." *Journal of Financial Economics*, 50 (1998), 101–122.
Rogers, W. "Regression Standard Errors in Clustered Samples." *Stata Technical Bulletin*, 13 (1993), 19–23.
Stein, J. C. "Rational Capital Budgeting in an Irrational World." *Journal of Business*, 69 (1996), 429–455.
Stoughton, N. M.; K. P. Wong; and J. Zechner. "IPOs and Product Quality." *Journal of Business*, 74 (2001), 375–408.
Subrahmanyam, A., and S. Titman. "The Going-Public Decision and the Development of Financial Markets." *Journal of Finance*, 54 (1999), 1045–1082.
Teoh, S. H.; I. Welch; and T. J. Wong. "Earnings Management and the Underperformance of Seasoned Equity Offerings." *Journal of Financial Economics*, 50 (1998), 63–99.
Van Bommel, J. "Messages from Market to Management: The Case of IPOs." *Journal of Corporate Finance*, 8 (2002), 123–138.
Van Bommel, J., and T. Vermaelen. "Post-IPO Capital Expenditures and Market Feedback." *Journal of Banking and Finance*, 27 (2003), 275–305.
Welch, I. "Seasoned Offerings, Imitation Costs, and the Underpricing of Initial Public Offerings." *Journal of Finance*, 44 (1989), 421–449.
White, H. "A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity." *Econometrica*, 48 (1980), 817–838.
Williams, R. L. "A Note on Robust Variance Estimation for Cluster-Correlated Data." *Biometrics*, 56 (2000), 645–646.