

Managerial Overoptimism and the Choice Between Debt and Equity Financing

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This paper compares long-run stock performance following debt financing and equity financing for a sample of rapidly growing firms. If managers are subject to overly optimistic predictions for their asset acquisitions, they are more likely to finance asset growth by debt rather than by equity. The managerial overoptimism hypothesis predicts worse long-term performance for debt-financed asset acquisitions than equity-financed asset acquisitions. If, on the other hand, managers take advantage of “windows of opportunity” for issuing equity, we expect worse performance following equity issuance than following debt issuance. Consistent with the managerial overoptimism hypothesis, we find that debt financing is followed by significantly worse stock performance than equity financing. Managerial overoptimism seems to be a significant factor affecting the choice between debt and equity financing and post-financing stock performance.

keywords: Overoptimism, Overconfidence, Debt financing, Equity financing, Long-run stock performance

Introduction

Evidence of poor stock and operating performance following equity issues has led to the hypothesis that managers take advantage of periods of high stock prices and investor overoptimism in order to sell overpriced equity. This “windows of opportunity” hypothesis suggests that managers time equity issues when their firm’s shares are overpriced (Ritter [1991]). This hypothesis, however, cannot be used to explain poor stock performance following debt issues documented by Spiess and Affleck-Graves [1999] and Datta, Iskandar-Datta and Raman [2000]. Underperformance following debt financing indicates a need for an alternative hypothesis that can explain these findings.

We suggest that managerial overoptimism is a factor that can explain poor long-term stock performance following stock and, especially, bond issuance. Recent studies show that managerial overoptimism affects corporate decisions (e.g., Heaton [2002], Gervais, Heaton and Odean [2003], Malmendier and Tate [2003 and 2005]). As managers are more affected by the performance of their firm than are well-diversified shareholders, moderate managerial overoptimism can help

to ensure that managers behave in the best interest of shareholders by counteracting the effect of managerial risk aversion; however, strong managerial overoptimism can result in the undertaking of negative net present value projects and destruction of a firm’s value (Gervais, Heaton and Odean [2003]). An excessively favorable estimate of future outcomes for investments is the crux of this managerial overoptimism hypothesis. When managers have optimistic predictions of investment outcomes, they are more inclined to finance with debt rather than equity. Confidence about the size of future outcomes makes managers unwilling to share future profits with new equity investors and make them more willing to issue debt rather than equity.

This study tests the managerial overoptimism hypothesis by examining post-financing stock performance for both debt and equity financing. If managerial overoptimism has a more significant effect on the choice between debt and equity financing and post-financing performance than manager attempts to time the market and take advantage of windows of opportunity for issuing equity, we expect worse stock performance following debt financing than following equity financing.

We focus on a sample of firms with rapid growth in assets and a corresponding need to finance those assets. By focusing on firms that require asset financing, security issuance for other purposes can be largely eliminated. Furthermore, since studying long-term performance does not require identifying a particular issuance date, our study is not limited to firms with explicit announcements of security issuance. Rather than

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limiting the study to firms that announce new issues of debt or equity, we include all forms of financing and measure financing by the change in debt or change in equity. In this manner, implicit security issuance such as stock-for-stock mergers can be incorporated in the sample. Another reason for focusing on high-growth firms is our expectation of stronger managerial overoptimism among these firms. All else being equal, overoptimistic managers perceive that they have more good projects available than other managers. As managers should take all projects they believe to have positive net present value, overoptimistic managers would undertake more projects resulting in the faster growth of their firms.

There are two reasons why it is important to focus on a sample affected by strong managerial overoptimism in a study examining whether managerial overoptimism affects the choice between debt and equity financing and poor post-financing performance. First, the windows of opportunity hypothesis and the managerial overoptimism hypothesis are not mutually exclusive. It is possible that while some managers choose between debt and equity financing to take advantage of windows of opportunity, other managers are significantly affected by overoptimism when making security choice decisions. Even the same manager can be affected by both factors at the same time: an overoptimistic manager may attempt to take advantage of share mispricings. Because of market timing to sell overpriced shares, equity financing will be followed by worse post-financing stock performance than debt financing. Because of the managerial overoptimism effect on the choice between debt and equity financing, debt financing will be followed by worse stock performance. As these factors work in opposite directions, the effect of market timing can cancel the effect of managerial overoptimism in a sample of all debt and equity issues. The second reason for focusing on a sample affected by strong managerial overoptimism is related to the market overoptimism. Poor post-financing stock performance indicates that the market is overoptimistic about the firm obtaining external financing. Overoptimistic managers prefer debt financing to equity financing when they perceive their shares to be underpriced, which happens when managers are more overoptimistic about their firm's future than is the market. As the market is overoptimistic about financing firms, overoptimistic manager preference for debt financing will be observed only for the most overoptimistic managers whose overoptimism exceeds the overoptimism of the market. Consequently, if we would examine the whole population of firms obtaining external financing, it is likely that we would find no evidence of worse stock performance following debt financing than equity financing, even if managerial overoptimism significantly affects the choice between debt and equity financing and post-financing stock performance. This

expectation is consistent with the Jung, Kim and Stulz [1996] study that compares stock performance after new bond issues and primary stock offerings and, when controlling for the characteristics of issuing firms, find no significant difference in the post-issue performance.

We examine a sample of high-growth firms that includes the top 10% of firms in the Compustat database, based on their one-year percentage total asset growth. The resulting sample contains firms with significant financing during the examined year. We study two subsets of the high-growth sample: a sample of firms that primarily use debt to finance asset growth and a sample of firms that primarily use external equity to finance asset growth. If more overly optimistic managers use debt financing, then we would find worse performance for the sample that primarily uses debt financing. Worse performance for the sample of equity-financing firms could provide support for the windows of opportunity hypothesis. We find that debt financing is associated with significantly worse post-financing one- to five-year stock performance. For example, in the first post-financing year, our debt-financing sample underperforms our equity-financing sample by 8% to 10%, depending on the methodology used to control for risk. We control for risk using the matched-sample approach advocated by Barber and Lyon [1997] and a four-factor model, including the three Fama and French [1993] factors supplemented by a momentum factor.

We also examine the effect of the choice between debt and equity financing on post-financing performance using a continuous variable to measure a firm's reliance on debt financing and controlling for firm characteristics. Furthermore, we test the robustness of our results using restricted samples. Regardless of the test design, we find that stronger reliance on debt financing is associated with worse post-financing stock performance. Our results support the notion that the choice between debt and equity financing and post-financing stock performance are affected by managerial overoptimism.

Alternate Hypotheses

Several hypotheses have been presented to explain the price reaction to the announcement of security issuance and the performance following that issuance. In the signaling model presented by Myers and Majluf [1984], investors learn about the private information managers have about the value of the firm's assets from their choice of financing. Managers avoid issuing securities they believe are underpriced and avoid sharing the value added from good investment opportunities with outside investors. Managers prefer to fund investments internally and issue lower-risk securities when outside capital is needed. This hypothesis provides background

for the managerial overoptimism hypothesis and the windows of opportunity hypothesis.

Managerial Overoptimism Hypothesis

A corollary to the signaling hypothesis is the suggestion that managers who are overoptimistic about their firm's ability to generate wealth-creating projects and believe their equity to be undervalued prefer to issue debt rather than equity. Heaton [2002] formalizes the model examining the effect of managerial overoptimism on corporate decisions. He suggests that when managers are overoptimistic about the firm's prospects, they perceive their firm's risky securities to be undervalued and, to avoid issuing underpriced securities, prefer debt issues to equity issues. Also, since overoptimistic managers overvalue the projects available to them, they undertake some projects that are negative net present value projects even though their intentions are to act in the best interests of their shareholders.

Recent empirical studies support Heaton's [2002] hypothesis that overoptimistic managers prefer debt financing to equity financing. Malmendier, Tate and Yan [2006] examine a sample of Forbes 500 firms and find that overconfident CEOs are more likely to issue debt than equity. Furthermore, Marciukaityte [2006] finds that firms obtaining substantial debt financing have higher discretionary accruals than firms obtaining substantial external equity financing. She suggests that high discretionary accruals at the time of debt financing are due to managerial overoptimism.

Poor stock performance following equity and debt issues (e.g., Ritter [1991], Loughran and Ritter [1995] Spiess and Affleck-Graves [1995 and 1999], Datta, Iskandar-Datta and Raman [2000]) suggests that the market is overoptimistic about the value of firms obtaining external financing. For overoptimistic managers to believe that their firm is undervalued, they need to be more overoptimistic than the market about the value of their firm. Behavioral studies suggest that at least the most overoptimistic managers are even more overoptimistic about the value of their firms than the market. These studies show that overoptimism and overconfidence are not just characteristics of laypeople; managers are also likely to be overconfident. After testing overconfidence among groups of managers from different industries, Russo and Schoemaker [1992] conclude that "every group believed it knew more than it did about its industry or company" and more than 99% were overconfident. Also, Langer [1975] and Weinstein [1980] show that people tend to be more overoptimistic about outcomes when they believe they have control of those outcomes. Of course, managers do have more control of their firms than investors do. Furthermore, desirability of outcomes and commitment to outcomes increase overoptimism (Frank [1935], Weinstein [1980]). As managers' com-

pensation and reputation are affected by the performance of their firms, managers are likely to be more strongly committed to their firms than investors. Even higher intelligence does not seem to protect against overoptimism; Klaczynski and Fauth [1996] show that overoptimism is actually more severe among people with superior intellectual abilities. Furthermore, as some of the factors affecting managerial and market overoptimism may be the same, e.g., past performance of the firm or past performance of similar firms, managers are likely to be the most overoptimistic when the market is overoptimistic. Thus, the most overoptimistic managers will perceive their firm to be undervalued by the market even when it is overvalued.

Managerial optimism for individual projects can extend to overconfidence in the ability to add value to any acquired assets, including acquiring an entire firm. Within the context of a merger, the managerial overconfidence is referred to as "Managerial Hubris." It is an explanation for acquiring firms paying substantial premiums to acquire targets, where the premiums are in excess of managerial ability to add value to the target assets. The methodology of this study incorporates merger activity within its definition of firm growth, since asset growth can be accomplished either through capital expenditure for new assets, purchase of existing assets from another firm, or mergers. Likewise, debt or equity issued to finance a merger or acquisition is incorporated within the methodology of this study. Such debt or equity issuance will not be accompanied by an announcement of a new security offering even though the effect is the same whether securities are issued via a public offering or in conjunction with a merger or acquisition.

Windows of Opportunity Hypothesis

If managers are reluctant to issue underpriced securities, then equity issuance would occur primarily when managers perceive these securities to be overpriced. The managerial practice of issuing overpriced equity receives empirical support in the study by Ritter [1991] of stock underperformance after initial public equity offerings (IPOs). Ritter finds that IPO firms underperform matching firms for three years after the first day of public trading. Such underperformance is even stronger for firms going public in years with heavy IPO activity. These findings, Ritter suggests, "indicate that issuers are successfully timing new issues to take advantage of 'windows of opportunity.'" (p. 4) If investors are overoptimistic about the firm value in certain periods, making equity issues in those periods allows a firm to raise the same amount of money with an issue of fewer shares, taking advantage of new shareholders. This hypothesis suggests that investors are overoptimistic about the value of a firm at the time of the

offering and are slow to react to the information contained in the announcement of security issue.

Loughran and Ritter (1995) and Spiess and Affleck-Graves (1995) show that post-issue underperformance is not restricted to IPOs; firms making seasoned public equity offerings also underperform matched firms in the one- to five-year post-issue periods. The type of equity offering, public or private, also seems not to matter. Private placements of equity are followed by similar-size stock underperformance as public equity issues (Hertzel, Lemmon, Linck and Rees [2002]). Furthermore, post-issue underperformance is not limited to equity issues in the United States. Levis [1995] documents poor post-issue performance in the United Kingdom. Kang, Kim and Stulz [1999] show that private and public equity issues in Japan are followed by similar poor post-issue performance as equity issues in the United States.

Although empirical evidence of underperformance following equity issuance is consistent with the windows of opportunity hypothesis, underperformance following debt issuance is not consistent with this hypothesis. However, several studies find stock underperformance following public straight and convertible debt offerings (Spiess and Affleck-Graves [1999]), initial debt offerings (Datta, Iskandar-Datta and Raman [2000]), and bank loans (Billett, Flannery and Garfinkel [2002]). These findings bring into question the windows of opportunity hypothesis as the only explanation of the post-financing underperformance. Since the cost of debt financing depends primarily upon market interest rates and not specific firm performance, managers are not likely to have any better forecast of the future direction of interest rates than do outside investors. Even with private information about the default risk of the issuing company, the value benefits are greater from selling overpriced equity than overpriced debt prior to information about the true default risk becoming public.

Sample and Methodology

Sample

We compile the high-growth sample using the following steps. First, we identify the set of firm-years that are included in both CRSP and Compustat databases during the period 1981-1999. We limit this set to firm-years with the data necessary to identify the high-growth sample, the debt-financing sample, and the equity-financing sample. We exclude regulated utilities (SIC codes 4910-4949), depository institutions (SIC codes 6000-6099), and holding or other investment offices (SIC codes 6700-6799). We consider only fiscal years that are 12 months long. The high-growth sample includes firm-years in the highest decile of as-

set growth. We calculate the asset growth as a change in total assets (Compustat item A6) during one fiscal year, divided by total assets at the beginning of the fiscal year. This procedure limits the sample to 7,664 firms. Furthermore, to reduce the problem of cross-sectional dependence of observations, we require that firm-years for the same firm are at least five years apart. If we have more than one firm-year in any five-year period, we include only the earliest one. This procedure creates the high-growth sample including 5,583 firms.

The percentage growth in total assets is evaluated for an event year, defined as Year 0. We define the event day as the last day of the third month after Year 0. We use the three-month lag after the end of the fiscal year to allow the market to have access to each firm's accounting information for Year 0. Our post-event period starts three months after the end of Year 0.

After compiling the sample of high-growth firms and determining event days, we subdivide the high-growth sample into subsamples that use primarily debt and external equity financing. The debt-financing sample includes firms with debt financing at least 50% higher than external common-equity and internal equity financing during Year 0, and the equity-financing sample includes firms with external common-equity financing at least 50% higher than debt or internal equity financing during Year 0. We calculate debt financing as a change in total debt (total long-term debt (item A9) plus debt in current liabilities (item A34)) during Year 0, equity financing as a change in common equity (item A60) minus a change in retained earnings (item A36) during Year 0, and internal financing as a change in retained earnings plus depreciation and amortization expenses (item A14) during Year 0. The debt-financing sample includes 1,914 high-growth firms, and the equity-financing sample includes 2,537 high-growth firms.

The benefit of our methodology is that the net of all the firm's financing activities can be considered rather than only one financing event. Debt issues are frequently motivated by refinancing, either to roll over existing debt that is maturing, to change the maturity of the firm's debt, or to take advantage of lower interest rates. McLaughlin, Safieddine and Vasudevan [1998] find that about a quarter of their sample of debt offerings resulted in either a negative change in leverage or no change in leverage. Similarly, a debt issue followed by a larger equity issue or an equity issue followed by an even larger debt issue will mask the true nature of the firm's overall financing strategy.

In Table 1, we examine the chronological distribution of the high-growth, debt-financing, and equity-financing samples. The high-growth sample is well distributed across time with none of the years including more than 10% of the events. We also find that at least 5% of the high-growth firms are from

Table 1. *Calendar Distribution of Events*

Year	High-Growth Sample		Debt-Financing Sample		Equity-Financing Sample	
	Number of Events	Percent of Events	Number of Events	Percent of Events	Number of Events	Percent of Events
1981	164	2.94	87	4.55	50	1.97
1982	148	2.65	71	3.71	53	2.09
1983	168	3.01	37	1.93	100	3.94
1984	151	2.70	71	3.71	55	2.17
1985	232	4.16	97	5.07	79	3.11
1986	286	5.12	129	6.74	108	4.26
1987	369	6.61	131	6.84	166	6.54
1988	257	4.60	120	6.27	87	3.43
1989	196	3.51	81	4.23	71	2.80
1990	191	3.42	69	3.61	77	3.04
1991	187	3.35	34	1.78	92	3.63
1992	270	4.84	54	2.82	164	6.46
1993	313	5.61	71	3.71	182	7.17
1994	380	6.81	116	6.06	183	7.21
1995	413	7.40	115	6.01	194	7.65
1996	539	9.65	141	7.37	298	11.75
1997	499	8.94	177	9.25	228	8.99
1998	419	7.50	184	9.61	165	6.50
1999	401	7.18	129	6.74	185	7.29
Total	5,583	100	1,914	100	2,537	100

Note: We create the high-growth sample using the following steps: (1) identify firms included in both CRSP and Compustat databases during 1981-1999; (2) limit this set to firm-years with the data necessary to identify the high-growth sample, the debt-financing sample, and the equity-financing sample; (3) exclude regulated utilities (SIC codes 4910-4949), depository institutions (SIC codes 6000-6099), and holding or other investment offices (SIC codes 6700-6799); (4) limit the set to the top 10% based on the percentage growth in total assets; (5) if the same firm is included more than once in any five-year period, include only the earliest firm-year in that period. The year during which the growth in total assets is estimated is defined as Year 0. Event day is defined as the last day of the third month after the end of Year 0. The debt-financing sample includes firms with debt financing at least 50% higher than external common-equity financing and internal financing during Year 0. The equity-financing sample includes firms with external common-equity financing at least 50% higher than debt financing and internal financing. Debt financing is a change in total debt during Year 0; external common-equity financing is a change in common equity minus a change in retained earnings; and internal financing is a change in retained earnings plus depreciation and amortization expenses. Table reports the distribution of events by year.

business services, electronic and other electric equipment; industrial machinery and equipment; chemicals and allied products; instruments and related products; or oil and gas extraction industries (not presented in a table).

Table 2 describes select firm characteristics. High-growth firms tend to be small firms; the median market value of equity is only \$76 million on the event day. The median growth in total assets during Year 0 is 108%, resulting in a median firm more than doubling its total asset size during this year. We estimate the book-to-market of equity following the procedure in Fama and French [1993] at the end of Year 0. To avoid the effect of financing obtained during Year 0, we obtain the debt-to-asset ratio at the beginning of Year 0. We estimate internal and total financing during Year 0. The total financing is a change in total assets plus depreciation and amortization expenses. Comparing the debt-financing and equity-financing samples, we find that debt-financing firms tend to be larger, have

higher book-to-market of equity ratios, have higher debt-to-asset ratios, and raise more internal financing than equity-financing firms.

Matched Samples

We estimate post-financing abnormal performance relative to the performance of the sample matched by size, prior return and book-to-market. We exclude the high-growth firms from the matched sample for the five years before and five years after the events.

To create the size-, prior-return- and book-to-market-matched sample, we form 20 size (market value of equity) portfolios from the CRSP database firms at the end of each month during the sample period. All size portfolios for the same month have an equal number of firms. We subdivide each size portfolio into five prior-return portfolios. We estimate prior returns as raw six-month holding-period returns, with the holding period ending on the day we evaluate the firm's size.

Table 2. *Select Firm Characteristics*

	High-Growth Sample		Debt-Financing Sample		Equity-Financing Sample	
	Mean	Median	Mean	Median	Mean	Median
Market value of equity, \$M	717.39	76.35	603.86	75.86	502.54	71.39
Growth in total assets, percent	189.27	108.42	176.63	98.87	205.39	127.68
Book-to-market of equity	1.19	0.34	1.32	0.45	0.84	0.29
Debt-to-asset ratio	0.28	0.18	0.29	0.24	0.29	0.13
Internal financing/total financing	0.02	0.10	0.06	0.09	−0.14	0.05

Note: Table reports select characteristics of sample firms. The high-growth sample includes the top 10% by the annual percentage growth in total assets during 1981-1999. The debt-financing sample includes high-growth firms with debt financing at least 50% higher than external common-equity financing and internal financing during Year 0. The equity-financing sample includes high-growth firms with external common-equity financing at least 50% higher than debt financing and internal financing. The market value of equity is estimated on the event day; the debt-to-asset ratio is estimated at the beginning of Year 0; all other variables are estimated at end of or during Year 0. Total financing is a change in total assets plus depreciation and amortization expense.

Next, for each high-growth firm, we assign the appropriate size and prior return portfolio. Then, from the assigned portfolio, we select the firm that most closely matches the high-growth firm's book-to-market ratio for the matched sample.

We estimate the market value of equity for high-growth firms on the event day (three months after the end of Year 0 and right before the beginning of the post-event period), the book-to-market ratio at the end of Year 0, and the prior returns for the six-month period ending on the event day. To ensure the similarity of high-growth and matched firms, we require that matched firms satisfy the same data availability requirements as the ones used for high-growth firms. If a matched firm does not satisfy such requirements, we choose the next best match.

Buy-and-Hold Abnormal Returns

To assess post-financing stock performance, we use buy-and-hold abnormal returns. We first calculate buy-and-hold returns for each firm in the high-growth and matched samples:

$$BHR_{i,a,b} = \left[\prod_{t=a}^b (1 + R_{i,t}) \right] - 1, \quad (1)$$

where $BHR_{i,a,b}$ is the buy-and-hold return for firm i during the period from a to b and $R_{i,t}$ is the monthly return for firm i in month t .

The difference between the high-growth and matched firm buy-and-hold returns is the buy-and-hold abnormal return (BHAR). When a sample firm or a matched firm is delisted before the end of the holding period, we use BHARs for the longest holding period available (e.g., Hertzel, Lemmon, Linck and Rees [2002]). Following suggestions of Barber and Lyon [1997], we use the conventional t -statistic to evaluate statistical significance of our results. Further-

more, we estimate bootstrapped p -values. We follow the methodology in Lyon, Barber and Tsai [1999], except as the control firm approach we use eliminates skewness bias (Barber and Lyon [1997], Lyon, Barber and Tsai [1999]), we do not adjust for skewness.

To avoid delisting bias, we adjust returns following Shumway [1997] and Shumway and Warther's [1999] suggestions. When a firm is delisted from CRSP, we use CRSP delisting return as the last return. When delisting returns are missing and a firm is delisted for performance reasons, we use -30% as the last return for NYSE and AMEX firms and -55% for Nasdaq firms. We also use these adjustments when estimating calendar-time abnormal returns. Adjusting returns of delisted firms does not have a significant effect on our results.

The main advantage of assessing the post-event stock performance using buy-and-hold returns is the easy interpretation of these results. Buy-and-hold abnormal returns show returns to the investor who invests an equal amount in each sample firm and short sells matched firms for the same amount. However, Mitchell and Stafford [2000] point out that cross-sectional dependence can lead to inflated values of test statistics for buy-and-hold returns. Consequently, we incorporate into our methodology calendar-time procedures that are not subject to this criticism.

Four-Factor Model

For a robustness check on our results for buy-and-hold returns, we test whether the difference in returns on debt-financing and equity-financing samples can be explained by the four-factor model using three Fama and French [1993] factors and a momentum factor (Carhart [1997]). The advantage of this procedure is its robustness to cross-sectional dependence problems noted by Fama [1998] and Mitchell and Stafford [2000]. To assess the significance of the difference in the performance after debt and equity financing, we

Table 3. Comparison of the Buy-and-Hold Abnormal Returns of Debt-Financing and Equity-Financing Samples

	Post-Financing Buy-and-Hold Size-, Prior Return- and Book-to-Market-Adjusted Returns				
	1 Year	2 Years	3 Years	4 Years	5 Years
Debt-financing sample					
Mean	-14.03%***	-18.04%***	-20.19%***	-21.36%***	-23.30%***
(<i>t</i> -statistic)	(-5.08)	(-4.36)	(-4.46)	(-4.38)	(-4.17)
<i>p</i> -value	0.000	0.000	0.000	0.000	0.000
No. of obs.	1,768	1,768	1,768	1,768	1,768
Equity-financing sample					
Mean	-6.16%**	-7.82%**	-8.91%**	-7.63%	-8.61%
(<i>t</i> -statistic)	(-2.31)	(-2.04)	(-2.05)	(-1.42)	(-1.16)
<i>p</i> -value	0.013	0.022	0.030	0.126	0.223
No. of obs.	2,323	2,323	2,323	2,323	2,323
Difference between debt-financing and equity-financing samples					
Mean	-7.87%**	-10.22%**	-11.28%**	-13.72%**	-14.69%*
(<i>t</i> -statistic)	(-2.05)	(-1.81)	(-1.80)	(-1.89)	(-1.58)

Note: This table compares stock performance of debt-financing and equity-financing samples following the high-growth year (Year 0). The debt-financing sample includes high-growth firms with debt financing at least 50% higher than external common-equity financing and internal financing during Year 0. The equity-financing sample includes high-growth firms with external common-equity financing at least 50% higher than debt financing and internal financing during Year 0. The post-financing period starts after the event day, three months after the end of the fiscal Year 0. *T*-statistics reported in the parentheses are cross-sectional *t*-statistics, and *p*-values are bootstrapped *p*-values.

*** ** and * Significance at the 1 %, 5 % and 10% levels, respectively (based on *t*-statistics; one-tail tests for the differences, two-tail tests for other tests).

estimate the four-factor model:

$$R_{dt} = \alpha + \beta_m(R_{mt} - R_{ft}) + \beta_sSMB_t + \beta_hHML_t + \beta_uUMD_t + \varepsilon_t, \quad (2)$$

where R_{dt} is the difference in monthly returns between debt-financing and equity-financing samples for month t , $(R_{mt} - R_{ft})$ is the excess return on the market, SMB_t is the difference in returns between a portfolio of small and large stocks, HML_t is the difference in returns between high and low book-to-market stocks, and UMD_t is the difference in returns between high and low prior return stocks. To estimate the difference in monthly returns between debt-financing and equity-financing samples for the one-year post-financing period, we use the following procedure. Each month, we identify all debt-financing sample firms that had an event date in the last year and calculate the monthly average return on these firms. We use the same procedure to estimate the monthly average return for the equity-financing sample. The difference in these monthly returns is R_{dt} . We also use this procedure to estimate the difference in returns for the two- to five-year post-financing periods. We obtain the excess return on the market and SMB_t , HML_t , and UMD_t factors from Kenneth French's Web site (mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html). The estimation procedure for SMB_t and HML_t factors is described in Fama and French

[1993]. The estimation procedure for UMD_t is similar to the one used in Carhart's [1997] study and is described on French's Web site. If this model is able to effectively capture the expected returns, in the absence of the difference in performance after debt and equity financing, the intercept α should be equal to zero.

Stock Performance Following Debt and Equity Financing

Buy-and-Hold Abnormal Returns

In Table 3, we examine post-event stock performance for the debt-financing and equity-financing samples. Consistent with earlier post-financing performance studies (e.g., Ritter [1991], Spiess and Afleck-Graves [1995 and 1999]), we find that firms perform poorly for a number of years after obtaining substantial debt or equity financing. In the first post-financing year, debt-financing firms underperform size-, prior-return-, and book-to-market-matched firms by 14%, significant at the 1% level; and equity-financing firms underperform their matched firms by 6%, significant at the 5% level. The five-year buy-and-hold abnormal returns are -23% for the debt-financing sample, significant at the 1% level, while they are not significantly different from zero for the equity-financing sample.

To examine whether the type of financing used to fund a firm's growth affects post-financing stock

Table 4. Examining the Difference in the Post-Event Performance Between Debt-Financing and Equity-Financing Samples Using the Four-Factor Model

	$R_{dt} = \alpha + \beta_m(R_{mt} - R_{ft}) + \beta_s SMB_t + \beta_h HML_t + \beta_u UMD_t + \varepsilon_t$				
	α (<i>t</i> -statistic)	β_m (<i>t</i> -statistic)	β_s (<i>t</i> -statistic)	β_h (<i>t</i> -statistic)	β_u (<i>t</i> -statistic)
One-year returns	-0.8969*** (-3.05)	-0.0199 (-0.27)	-0.5098*** (-5.43)	0.8933*** (7.98)	0.1636** (2.36)
Implied one-year	-10.25%				
Two-year returns	-0.8488*** (-3.45)	-0.0025 (-0.04)	-0.3965*** (-5.14)	0.8343*** (9.01)	0.1687*** (3.04)
Implied two-year AR	-18.50%				
Three-year returns	-0.7148*** (-3.04)	-0.0369 (-0.64)	-0.3473*** (-4.75)	0.8137*** (9.35)	0.2066 (4.00)
Implied three-year AR	-22.76%				
Four-year returns	-0.7434*** (-3.51)	-0.0658 (-1.27)	-0.3790*** (-5.79)	0.7232*** (9.24)	0.1668*** (3.63)
Implied four-year AR	-30.10%				
Five-year returns	-0.7181*** (-3.71)	-0.0560 (-1.19)	-0.3909*** (-6.53)	0.6631*** (9.27)	0.1267*** (3.02)
Implied five-year AR	-35.11%				

Note: This table reports the results from the estimations of the four-factor model. We test whether the four-factor model can explain the difference in the post-event returns between debt-financing and equity-financing samples. To estimate the monthly average returns for the one-year period, each month we identify all debt-financing sample firms that had an event date in the last year and calculate the monthly average return for these firms. We use the same procedure to estimate the monthly average return for the equity-financing sample. R_{dt} is the difference in the average returns for month t for the debt- and equity-financing samples; $(R_{mt} - R_{ft})$ is the excess return on the market; SMB_t is the difference in returns between a portfolio of small and large stocks; HML_t is the difference in returns between high and low book-to-market stocks; and UMD_t is the difference in returns between high and low prior return portfolios. The difference in monthly returns between the debt- and equity-financing samples not explained by the four-factor model is determined by the intercept term α . Analogical procedure is used to estimate the two- to five-year monthly abnormal returns. We also estimate the implied difference in returns for the one- to five-year periods $((1 + \alpha/100)^n - 1)$, where n is the number of months in the estimation period).

***, **, and * Significance at the 1%, 5% and 10% levels, respectively (one-tail test for the significance of α , Two-tail tests for other coefficients).

performance, we test the difference in buy-and-hold abnormal returns for the debt-financing and equity-financing samples. If managers time equity issues to take advantage of overvalued equity, we expect worse performance for the equity-financing sample. If manager choice between debt and equity financing is affected by managerial overoptimism, we expect worse performance for the debt-financing sample. Table 3 shows that stock performance is significantly worse after debt financing than after equity financing. In the first post-event year, the debt-financing sample underperforms the equity-financing sample by 8%, significant at the 5% level. The difference in buy-and-hold abnormal returns remains significant at the 10% or higher level for at least five post-financing years. These findings are consistent with the hypothesis that managerial overoptimism affects the choice between debt and equity financing and poor post-financing performance.

The Four-Factor Model

As a robustness check, we test the difference in post-event performance between the debt-financing and equity-financing samples using the four-factor

model, including three Fama and French [1993] factors and a momentum factor (Carhart [1997]) (Table 4). The evidence of worse post-event performance by the debt-financing sample than by the equity-financing sample is even stronger here. The three Fama and French [1993] factors and a momentum factor cannot fully explain the difference in the performance after debt and equity financing. The unexplained difference in performance is statistically significant at the 1% level for at least five post-financing years. Implied returns suggest that the debt-financing sample underperforms the equity-financing sample by 10% in the first post-financing year and by 35% during the five post-financing years. These findings are consistent with the managerial overoptimism hypothesis, which predicts worse performance after debt financing than after equity financing.

Regression Analyses

The findings in Table 2 suggest that debt-financing firms have quite different characteristics than equity-financing firms. To assure that the difference in post-event performance between debt-financing and equity-financing firms is not driven by the differences in firm

Table 5. *Ordinary Least-Squares Regression Analyses*

Dependent Variable: Post-Financing Buy-and-Hold Size-, Prior Return- and Book-to-Market-Adjusted Returns					
	1 Year	2 Years	3 Years	4 Years	5 Years
Intercept	0.1139** (2.09)	0.1354* (1.71)	0.1240* (1.33)	0.1673 (1.51)	0.2939** (2.14)
Debt financing/total financing	-0.1866*** (-3.81)	-0.2056*** (-2.89)	-0.1857** (-2.23)	-0.2480*** (-2.50)	-0.2962*** (-2.40)
Logarithm of market value of equity	-0.0127 (-1.21)	-0.0151 (-0.99)	-0.0230 (-1.28)	-0.0231 (-1.09)	-0.0404 (-1.52)
Logarithm of percentage growth in total assets	-0.0067 (-0.26)	-0.0249 (-0.66)	-0.0342 (-0.77)	-0.0127 (-0.24)	-0.0134 (-0.20)
Logarithm of book-to-market of equity	0.0650*** (3.35)	0.0903*** (3.19)	0.0453 (1.37)	0.0358 (0.91)	0.0851* (1.74)
Debt-to-asset ratio	-0.0633 (-1.13)	-0.0602 (-0.74)	-0.1547 (-1.62)	-0.2450** (-2.15)	-0.2694* (-1.90)
Internal financing/total financing	0.0234 (0.55)	-0.0165 (-0.27)	0.0503 (0.69)	0.1372 (1.59)	0.0879 (0.82)

Note: This table examines the effect of the manager decision to use debt financing instead of equity financing on the post-financing performance while controlling for other variables. We use the ratio of debt financing to proxy for a firm's reliance on debt financing. The sample includes all high-growth firms. We obtain all financing variables for Year 0. We estimate the market value of equity on the event day, the book-to-market of equity at the end of Year 0 and the debt-to-assets ratio at the beginning of Year 0. Debt financing is a change in total debt, total financing is a change in total assets plus depreciation and amortization expense and internal financing is a change in retained earnings plus depreciation and amortization expense. *T*-statistics are reported in parentheses.

***, ** and * Significance at the 1%, 5% and 10% levels, respectively (one-tail test for debt financing/total financing variable, two-tail tests for other variables).

characteristics, we control for firm-specific characteristics in regression models examining the financing choice in Table 5. The control variables include the logarithm of market value of equity, the logarithm of percentage growth in total assets, the logarithm of book-to-market ratio, the ratio of debt to assets and the ratio of internal financing to total financing. Smaller firms, higher-growth firms and lower book-to-market firms are harder for investors to appraise, leading to a higher probability of misvaluation of these firms and subsequent abnormal performance. Debt-to-asset ratio may proxy for a firm's access to debt markets and also for an uncertainty about a firm's future. Internal financing depends on a firm's profitability and may proxy for a firm's risk. We estimate the logarithm of market value of equity on the event day and the logarithm of book-to-market of equity ratio at the end of Year 0. As the end of Year 0 debt-to-assets ratio is affected by financing during Year 0 and is highly correlated with the percentage of asset growth financed by debt, we estimate the debt-to-assets ratio at the beginning of Year 0. The percentage growth in total assets, the change in total assets, internal financing, and total financing are estimated during Year 0. Internal financing is a change in retained earnings plus depreciation and amortization expense, and total financing is a change in total assets plus depreciation and amortization expense.

The dependent variables in Table 5 are one- to five-year post-financing buy-and-hold abnormal returns estimated relative to the size-, prior-return- and book-to-market-matched sample. To proxy for a firm's prefer-

ence for debt financing instead of equity financing, we use a ratio of debt financing (a change in total debt) to total financing during Year 0. If managerial overoptimism has a more significant effect on the choice between debt and equity financing than managerial attempts to take advantage of overvalued equity, we expect the estimated coefficients of the ratio of debt financing to total financing to be negative.

Consistent with our earlier findings, we find that the more a firm relies on debt financing, the worse is the post-financing stock performance (Table 5). The estimated coefficients for the ratio of debt financing to total financing are negative and significant at the 5% or higher level for all five holding periods examined. Thus, controlling for firm characteristics does not change our findings. Furthermore, none of the controlling variables is consistently significant in the regression analyses, suggesting that matching by size, prior return and book to market is sufficient to control for firm characteristics. Regression results confirm our earlier findings: consistent with the managerial overconfidence hypothesis, debt financing is followed by worse stock performance than equity financing.

Other Robustness Tests

To confirm the robustness of our finding of an inverse relation between a firm's reliance on debt financing and post-financing stock performance, in Table 6 we perform the same tests as in Table 5 but with restricted samples and with a different matched

Table 6. *Robustness Tests*

Dependent Variable: One-Year Post-Financing Buy-and-Hold Adjusted Returns				
	Model 1	Model 2	Model 3	Model 4
Intercept	0.0764** (2.19)	0.1038* (1.77)	0.1400* (1.69)	0.0295 (0.68)
Debt financing/total	-0.1006*** (-3.19)	-0.1806*** (-3.53)	-0.1628*** (-2.79)	-0.1618*** (-4.06)
Financing				
Logarithm of market value	-0.0135** (-1.99)	-0.0075 (-0.68)	-0.0090 (-0.60)	-0.0027 (-0.33)
equity				
Logarithm of percentage	-0.0396** (-2.38)	-0.0044 (-0.11)	-0.0146 (-0.48)	-0.0534** (-2.57)
growth in total assets				
Logarithm of	0.0416*** (3.32)	0.0668*** (3.23)	0.1001*** (4.17)	0.0236 (1.54)
book-to-market of equity				
Debt-to-asset ratio	-0.0348 (-0.96)	-0.1055 (-1.44)	-0.1094 (-1.55)	-0.0450 (-0.99)
Internal financing/total	0.0464* (1.68)	0.0181 (0.40)	0.0416 (0.81)	0.0206 (0.63)
financing				

Note: This table examines the effect of the manager decision to use debt financing instead of equity financing on the post-financing performance for restricted high-growth samples and size-adjusted returns. We use the ratio of debt financing to proxy for a firm's reliance on debt financing. In Models 1, 2 and 3, we adjust buy-and-hold returns using the size-, prior-return- and book-to-market-matched sample. Model 1 excludes the top 1% and the bottom 1% of the dependent variable values. Model 2 excludes the top 10% based on the percentage growth in total assets. Model 3 is restricted to the top 3 size (market value of equity) quartiles. In Model 4, we examine the full high-growth sample using size-adjusted buy-and-hold returns. We create the size-matched sample by finding a firm with the closest market value of equity for each high-growth sample firm on the event day. We obtain all financing variables for Year 0. We estimate the market value of equity on the event day, the book-to-market of equity at the end of Year 0 and the debt-to-assets ratio at the beginning of Year 0. Debt financing is a change in total debt, total financing is a change in total assets plus depreciation and amortization expense and internal financing is a change in retained earnings plus depreciation and amortization expense. *T*-statistics are reported in parentheses.

*** ** and * Significance at the 1%, 5% and 10% levels, respectively (one-tail test for debt financing/total financing variable, two-tail tests for other variables).

sample. The dependent variables in Models 1, 2 and 3 are one-year buy-and-hold size-, prior-return- and book-to-market-adjusted returns. The dependent variable in Model 4 is one-year buy-and-hold size-adjusted returns. First, we examine whether our results are affected by a few extreme value observations. Before estimating Model 1, we exclude from the high-growth sample the firms with buy-and-hold abnormal return values in the bottom 1% and the top 1%. The regression results are essentially the same as for the whole sample.

Our high-growth sample includes the top 10% of firms based on the percentage growth in total assets. To examine whether our results are driven by only a small percentage of highest-growth firms, in Model 2 we exclude the top 10% of sample firms based on the percentage asset growth. We find that the size and the statistical significance of the estimated coefficient for the ratio of debt financing to total financing are almost the same as for the full sample. Thus, our results are not driven by a small number of the highest-growth firms.

Some small firms have limited access to external financing, and their managers cannot freely choose between debt and equity financing based on their beliefs about the mispricing of their firm's equity. Including such firms may contaminate the sample. In Model 3

we examine the high-growth sample restricted to the top three quartiles based on the market value of equity on the event day. Again, the results are essentially the same as for the whole sample.

In Model 4 we examine the effect of our procedure for creating a matched sample and adjust returns using a size-matched sample. We create the size-matched sample by finding a firm with the closest market value of equity for each high-growth sample firm on the event day. This matching procedure does not significantly affect our results. A firm's reliance on debt financing is associated with worse post-event stock performance. Although in the table, we report only the results with one-year holding-period returns, the results are also not significantly affected by our restrictions and changes in the methodology for two- to five-year holding-period returns. Even with restricted samples and with a different matched sample, debt financing is associated with worse post-financing performance than equity financing.

Conclusions

This paper examines whether managerial overoptimism affects the choice between debt and equity

financing and whether it can help to explain poor post-financing stock performance. We focus on a sample of high-growth firms, as these firms could be more subject to managerial overoptimism. The windows of opportunity hypothesis suggested by earlier studies predicts worse performance following equity financing, while the managerial overoptimism hypothesis predicts worse performance following debt financing.

We find strong support for the managerial overoptimism hypothesis: the debt-financing sample significantly underperforms the equity-financing sample. Our findings do not provide support for the hypothesis that managers knowingly take advantage of overoptimistic investors by issuing overpriced common shares. Instead, our findings suggest that managerial overoptimism affects the choice between debt and equity financing and poor post-financing performance. Our study contributes to understanding of the factors leading to managerial behavior inconsistent with the best interests of shareholders. Understanding of such factors is important for designing more effective manager compensation schemes and more effective contracts between managers and their firms.

References

- Barber, B., and J.D. Lyon. "Detecting Long-Run Abnormal Stock Returns: The Empirical Power and Specification of Test Statistics." *Journal of Financial Economics*, 43, (1997), pp. 341–372.
- Billett, M., M.J. Flannery, and J.A. Garfinkel. "The Long-Run Performance of Firms Following Loan Announcements." Working paper, University of Iowa, (2002).
- Carhart, M.M. "On Persistence in Mutual Fund Performance." *Journal of Finance*, 52, (1997), pp. 57–82.
- Datta, S., M. Iskandar-Datta, and K. Raman. "Debt Structure Adjustments and Long-run Stock Price Performance." *Journal of Financial Intermediation*, 9, (2000), pp. 427–453.
- Fama, E.F. "Market Efficiency, Long-Term Returns, and Behavioral Finance." *Journal of Financial Economics*, 49, (1998), pp. 283–306.
- Fama, E.F., and K.R. French. "Common Risk Factors in the Returns on Stocks and Bonds." *Journal of Financial Economics*, 49, (1993), pp. 3–56.
- Frank, J.D. "Some Psychological Determinants of the Level of Aspiration." *American Journal of Psychology*, 47, (1935), pp. 285–293.
- Gervais, S., J.B. Heaton, and T. Odean. "Overconfidence, Investment Policy, and Executive Stock Options." Working Paper, Duke University, University of California at Berkeley, (2003).
- Heaton, J.B. "Managerial Optimism and Corporate Finance." *Financial Management*, 31, (2002), pp. 33–45.
- Hertzel, M., M. Lemmon, J.S. Linck, and L. Rees. "Long-Run Performance Following Private Placements of Equity." *Journal of Finance*, 57, (2002), pp. 2595–2618.
- Jung, K., Y.C. Kim, and R.M. Stulz. "Timing, Investment Opportunities, Managerial Discretion, and the Security Issue Decision." *Journal of Financial Economics*, 42, (1996), pp. 159–185.
- Kang, J.K., Y.C. Kim, and R.M. Stulz. "The Underreaction Hypothesis and the New Issue Puzzle: Evidence from Japan." *Review of Financial Studies*, 12, (1999), pp. 519–534.
- Klaczynski, P.A., and J.M. Fauth. "Intellectual Ability, Rationality, and Intuitiveness as Predictors of Warranted and Unwarranted Optimism for Future Life Events." *Journal of Youth and Adolescence*, 25, (1996), pp. 755–773.
- Langer, E.J. "The Illusion of Control." *Journal of Personality and Social Psychology*, 32, (1975), pp. 311–328.
- Levis, M. "Seasoned Equity Offerings and the Short- and Long-Term Performance of Initial Public Offerings in the UK." *European Financial Management*, 1, (1995), pp. 125–146.
- Loughran, T., and J.R. Ritter. "The New Issues Puzzle." *Journal of Finance*, 41, (1995), pp. 1959–1970.
- Lyon, J.D., B.M. Barber, and C.L. Tsai. "Improved Methods for Tests of Long-Run Abnormal Stock Returns." *Journal of Finance*, 54, (1999), pp. 165–201.
- Malmendier, U., and G. Tate. "Who Makes acquisitions? CEO Overconfidence and the Market's Reaction." Working Paper, Stanford University, Harvard University, (2003).
- Malmendier U., and G. Tate. "CEO Overconfidence and Corporate Investment." *Journal of Finance*, 60, (2005), pp. 2661–2700.
- Malmendier U., G.A. Tate, and J. Yan. Corporate Financial Policies with Overconfident Managers. AFA 2006 Boston Meetings Paper, (2006).
- Marciukaityte, D. "Financing Decisions and Discretionary Accruals: Managerial Manipulation or Managerial Overoptimism." Working Paper, Louisiana Tech University, (2006).
- McLaughlin, R., A. Safieddine, and G.K. Vasudevan. "The Information Content of Corporate Offerings of Seasoned Securities: An Empirical Analysis." *Financial Management*, 27, (1998), pp. 31–45.
- Mitchell, M.L., and E. Stafford. "Managerial Decisions and Long-Run Stock Price Performance." *Journal of Business*, 73, (2000), pp. 287–320.
- Myers, S.C., and N.S. Majluf. "Corporate Financing and Investment Decisions When Firms Have Information that Investors Do Not Have." *Journal of Financial Economics*, 13, (1984), pp. 187–221.
- Ritter, J.R. "The Long-Run Performance of Initial Public Offerings." *Journal of Finance*, 46, (1991), pp. 3–27.
- Russo, J.E., and P.J.H. Schoemaker. "Managing Overconfidence." *Sloan Management Review*, 33, (1992), pp. 7–17.
- Shumway, T. "The Delisting Bias in CRSP Data." *Journal of Finance*, 52, (1997), pp. 327–340.
- Shumway, T., and V.A. Warther. "The Delisting Bias in CRSP's Nasdaq Data and its Implications for the Size Effect." *Journal of Finance*, 54, (1999), pp. 2361–2379.
- Spiess, D.K., and J. Affleck-Graves. "Underperformance in Long-Run Stock Returns Following Seasoned Equity Offerings." *Journal of Financial Economics*, 38, (1995), pp. 243–267.
- Spiess, D.K., and J. Affleck-Graves. "The Long-Run Performance of Stock Returns Following Debt Offerings." *Journal of Financial Economics*, 54, (1999), pp. 45–73.
- Weinstein, N.D. "Unrealistic Optimism About Future Life Events." *Journal of Personality and Social Psychology*, 39, (1980), pp. 806–820.

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