Deviation from the Target Capital Structure and Acquisition Choices*

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Abstract

This study finds that the deviation from a firm's target capital structure plays an important role in acquisition decisions. Firms that are overleveraged relative to their target debt ratios are less likely to make acquisitions, acquire smaller targets, pay lower premiums and receive favorable market reactions to acquisitions. Furthermore, managers actively rebalance their capital structures in anticipation of acquisitions when they are overleveraged.

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Traditional theories of capital structure suggest that firms have target debt ratios that are determined by balancing the costs and benefits of debt financing. However, firms deviate from their target capital structures due to debt overhang, expected inflation, transaction costs and asymmetric information.[1] The deviation from the target debt ratio (henceforth, leverage deficit)[2] can potentially affect corporate investment choices through two channels. First, overleveraged firms may forgo positive NPV investments in the presence of market imperfections as positive leverage deficit constrains firms raising capital to finance new projects (financial constraint hypothesis)[3]. Second, Jensen (1986) suggests that managers of underleveraged firms may make negative NPV investment choices that benefit them personally (free cash flow hypothesis).

Although these two channels predict a negative association between acquisition activity and leverage deficit, they have different implications for underleveraged and overleveraged firms. On the one hand, the free cash flow hypothesis predicts that underleveraged firms are more likely to make acquisitions, pay higher premiums and receive unfavorable announcement returns relative to a control group of firms that do not deviate from their target capital structures (moderately leveraged firms). On the other hand, the financial constraint hypothesis suggests that overleverage prevents firms from pursuing all positive NPV projects; thereby overleveraged firms will only pursue the most value-enhancing acquisitions. These imply lower acquisition activity, lower premiums and higher market reaction to overleveraged acquirers relative to the control group. However, the free cash flow hypothesis does not imply these predictions as debt

[1] See Frank and Goyal (2009) for a review of factors influencing deviation from the target capital structure.
[2] Leverage deficit is defined as actual minus target debt ratio. Based on this definition, overleveraged firms have excessively positive leverage deficit (largest leverage deficit quartile), and underleveraged firms fall in the lowest leverage deficit quartile.
[3] Studies on the role of financing frictions on investment decisions include, but are not limited to, Myers (1977), Greenwald, Stiglitz and Weiss (1984) and Hart and Moore (1995).

loses its ability to constrain managers from undertaking (poor) acquisitions when the debt is excessive (Zwiebel (1996)).

In this paper, I empirically examine how the deviation from a firm's target leverage ratio influences its firm and asset acquisition decisions. I focus on acquisitions since there is detailed information about these investments, allowing an in-depth evaluation of the potential differences between the acquisition choices of underleveraged and overleveraged firms. Specifically, I examine whether a firm's leverage deficit affects the likelihood of making an acquisition, as well as the method of payment, announcement returns and premiums paid to the target. Finally, I examine *ex ante* managerial decisions on capital structure prior to acquisitions.

To empirically examine the effect of the leverage deficit on acquisition choices I utilize a two-step estimation procedure that is similar to Hovakimian, Opler and Titman (2001). In the first step, I estimate the target leverage ratio by running a regression of leverage ratios on the main determinants of capital structure considered in the prior studies.[4] In the second stage regressions, I examine whether the deviation from the predicted target capital structure affects acquisition decisions.

Results in this paper indicate that the estimated leverage deficit is strongly related to acquisitions choices: a one standard deviation decrease in the leverage deficit increases the likelihood of making an acquisition by 10.8% and increases the size of acquisition by 5.2 percent. However, the effect of leverage deficit on the likelihood of making an acquisition is not symmetric for underleveraged and overleveraged firms. While the effect of overleverage is negative and significant, underleverage has insignificant effect on the acquisition probability. The results hold for both firm and asset acquisitions and for both within- and cross-industry acquisitions. I also find significant effects of leverage deficit, which is driven by overleveraged

[4] See, e.g., Harris and Raviv (1991); Rajan and Zingales (1995); Frank and Goyal (2004).

firms, in payment choices and premiums paid to targets; overleveraged acquirers pay lower premiums and are less likely to use cash in their offers. Furthermore, acquisition announcement returns increase with leverage deficit. Specifically, this effect is significant for overleveraged acquirers and is even stronger when the offer is unexpected. These findings are not in line with the free cash flow hypothesis, but rather are consistent with the financial constraint hypothesis. Finally, I examine whether managers attempt to mitigate the negative effect of overleverage prior to acquisitions. I find that overleveraged firms lower their leverage deficit by 5.0% relative to their industry peers when they have a high likelihood of acquisitions. Collectively, these findings suggest that leverage deficit affects the ability to acquire as well as the terms of the deal, and managers actively rebalance their capital structures in anticipation of acquisitions when they are overleveraged.

These findings complement Harford et al. (2009) who also document the role of leverage deficit in method of payment *conditional* on making an acquisition. I show effects of leverage deficit in the ability to make acquisitions and ex ante capital structure decisions. Specifically, a positive leverage deficit decreases the premium paid by overleveraged acquirers; thereby it *unconditionally* limits the ability to make acquisitions and affects ex ante capital structure changes for overleveraged firms. These findings contribute to studies on the effects of leverage deficit on corporate policies. In particular, Frank and Goyal (2009) report firms adjusting debt ratios more quickly when they are overleveraged. The *significant* effect of overleverage and *insignificant* effect of underleverage on acquisitions documented in this paper suggest that a higher likelihood of forgoing acquisition opportunities may yield quicker leverage adjustments for overleveraged firms. I find further evidence confirming this prediction: overleveraged firms reduce leverage when they have high probability of undertaking an acquisition. These findings

also contribute to a growing number of studies examining the role of anticipation of investment opportunities on capital structure decisions. Specifically, Almazan et al. (2009) and Morellec and Zhdanov (2008) show that firms accumulate financial slack when they have acquisition opportunities. The findings in this paper establish a link between acquisitions and security issuance decisions through leverage deficit while extending the role of leverage deficit in security issuance[5] to real investment decisions.

This paper is also related to studies examining the role of financing frictions on corporate policies. In frictionless capital markets, firms should be able to finance all positive NPV projects with no restrictions on their forms of financing (Modigliani and Miller (1958)). However, financing frictions limit a firm's ability to fund new investments (Myers (1977), Myers and Majluf (1984), Jensen (1986), Hart and Moore (1995)). Using acquisitions in this study allows me to test whether overleverage constrains managers in investment decisions as well as the form and the level of financing. I show that overleveraged firms are less likely to go to debt markets and are more likely to use equity to finance their acquisitions if they are able to acquire. In addition, using equity does not suffice for overleveraged firms to offer premiums as high as other firms. This, in turn, constrains the acquisition activity of overleveraged firms. Therefore, this study suggests that excess positive leverage deficit not only limits the access to debt markets, but also constrains the exploitation of equity market, which, collectively, decreases the acquisition activity of overleveraged firms.

This paper also contributes to the literature on the effects of acquirers' leverage on acquisition announcement returns. There is no consensus on the role of leverage in acquisitions. For example, Maloney, McCormick and Mitchell (1993) find that market reactions increase with

[5] See Fama and French (2002), Flannery and Rangan (2004), and Kayhan and Titman (2007) for the role of leverage deficit in security issuance decisions.

the acquirers' debt ratios, while Moeller, Schlingemann and Stulz (2004) find no significant effect of leverage on market reactions to takeover announcements. The evidence in this paper suggests that leverage plays an important role in market reactions as long as excessive positive leverage deficit exists.

The paper is organized as follows. Section 1 provides details of sample selection and descriptive statistics of the data. Section 2 explains the determinants and estimation procedure of the target leverage ratio. Section 3 examines the empirical findings of the second stage regressions. Section 4 concludes.

1. Literature Review and Hypothesis Development

Consistent with traditional theories of capital structure, Graham and Harvey (2001) report that 81% of CFOs claim to have target debt ratios, which are determined by the costs and benefits of debt financing. Firms, however, deviate from their target capital structures due to debt overhang (Myers (1977)), expected inflation (Frank and Goyal (2007)), transaction costs (Leary and Roberts (2005)) and asymmetric information (Myers and Majluf (1984)). Hovakimian et al. (2001) show that deviations from the target capital structures influence security issuance decisions. Firms that are overleveraged relative to their target capital structures are more likely to issue equity while underleveraged firms are more likely to issue debt to move their debt ratios towards their target capital structures.

Deviations from the target capital structure are also likely to affect acquisition decisions. The free cash flow hypothesis suggests that managers of underleveraged firms more easily raise capital to make acquisitions benefitting them personally at the expense of shareholders (Jensen

(1986)). Acquisitions, in fact, may serve in the interest of managers in many forms (Morck et al. (1990)). As managerial compensation increases with the size of the company (Murphy (1999)), managers have incentives to manage larger firms. Managing a larger corporation may also generate non-monetary benefits. For example, managing large corporations might be more fulfilling due to hubris (Roll (1986); Moeller et al. (2004)). Furthermore, managers may prefer acquisitions due to career concerns (Shleifer and Vishny (1989)). As human capital of managers is not diversified and is tied to the survival of the company (Amihud and Lev (1981)), managers are tempted to reduce the firm risk through acquisitions of (unrelated) targets (Morck et al. (1990)). Overall, financial slack generated by unused debt capacity may provide means for managers to undertake acquisitions motivated by managers' personal preferences, which may not be in line with economic benefits for shareholders (Lang, Stulz and Walkling (1991)). Therefore, managers of underleveraged firms are more likely to make acquisitions, and these acquisitions are likely to result in overpayment for the target, and, thereby, negative market reaction to acquisition announcements. Notably, the free cash flow hypothesis does not necessarily imply overleveraged firms making good acquisitions as debt loses its ability to constrain managers from undertaking (poor) acquisitions when it is excessive (Zwiebel (1996)). In sum, the free cash flow hypothesis predicts that underleveraged firms are more likely to make acquisitions, pay higher premiums and receive unfavorable market reactions to acquisition announcements than are moderately leveraged firms.

Alternatively, the presence of market imperfections may enhance the effect of deviation from the target capital structure on acquisitions. In frictionless capital markets, firms finance all positive NPV projects with no restrictions on their forms of financing (Modigliani and Miller (1958)). However, financing frictions limit an (overleveraged) firm's ability to fund new

investments.[6] This would imply a lower likelihood of acquisitions for overleveraged firms. Even if overleveraged firms do make acquisitions, they will only pursue the most value-enhancing acquisitions. Therefore, they are more likely to pay lower premiums while receiving favorable market reactions to their acquisition announcements. It is important to note that based on the financial constraint hypothesis, underleveraged firms are not less conservative in selecting acquisition targets relative to moderately leveraged firms as both moderately and underleveraged firms would accept all positive NPV projects. Therefore, returns to underleveraged firms are not different from those to moderately leveraged firms.

Managers are likely to anticipate the limitations generated by financial constraints for future acquisitions. As acquisitions impact long run valuations, which are more likely to affect ex ante capital structure decisions (Strebulaev (2007)), managers are likely to mitigate the negative effect of excess positive leverage deficit on acquisitions through debt reduction. Consistent with this view, Almazan et al. (2009) and Morellec and Zhdanov (2008) show that firms accumulate financial slack when they have acquisition opportunities. Thus, the financial constraint hypothesis predicts that managers of overleveraged firms will reduce their leverage deficit when they anticipate a high likelihood of acquisitions.

2. Sample Selection and Descriptive Statistics

I use firms covered in COMPUSTAT and CRSP from 1990 to 2007 to estimate the target debt ratio. Following previous studies on capital structure[7], I exclude financial firms (6000-6999)

[6] Studies on the role of financing frictions on investment decisions include, but are not limited to, Myers (1977), Myers and Majluf (1984), Greenwald, Stiglitz and Weiss (1984), Hart and Moore (1995) and Lang et al. (1996).
[7] See Hovakimian, Opler and Titman (2001), Fama and French (2002), Flannery and Rangan (2005), Leary and Roberts (2005) and Kayhan and Titman (2005)

and regulated utilities (4900-4999). I drop firms with sales less than 10 million in 1990 dollars. In order to eliminate the effect of outliers, all variables are winsorized at the top and bottom 1% levels. I estimate the target leverage ratio for 60,630 firm-years over sample period by running a regression of leverage ratios on main determinants of capital structure considered in prior studies. I define leverage deficit as actual leverage minus predicted leverage, following Hovakimian et al. (2001), and examine whether leverage deficit affects acquisition decisions. For all firms in the sample, I obtain all completed acquisitions in the U.S. listed in the Securities Data Company's (SDC) Mergers and Acquisitions Database as a merger, an acquisition of majority interest, asset acquisition or acquisition of certain assets with transaction value greater than 1 million dollars. This process generates 10,807 acquisitions with average transaction value of $357 million. Of these transactions, only 15.8% are all-stock offers whereas 84.2% of the deals have a cash component. In particular, 29.9% of acquisitions are all-cash deals. As most cash deals are financed with debt (Bharadwaj and Shivdasani (2003); Harford et al. (2009)), these findings provide preliminary evidence on the importance of leverage deficit in financing acquisitions.

Table 1 reports the descriptive statistics of firms in the sample. The average total asset of firms in the sample is $2.656 billion. The market leverage has an average of 0.378 and has large standard deviation (0.245) around the mean.[8] The mean market leverage deficit is zero indicating that, on average, actual leverage is equal to target debt ratio. However, large variance around the mean implies that a subgroup of firms deviate from their target debt ratios. Specifically, 25% of firms in our sample are underleveraged by less than -13.6% and another 25%is overleveraged by more than 12.2 percent. The large variation of leverage deficit in the sample allows me to test the effect of leverage deficit on acquisitions. Table 1 also indicates that acquisitions play an

[8] Variable definitions are in the Data Appendix.

important role in the sample: 13.6% of firms in our sample make at least one acquisition during the study period and average annual transaction volume constitute 3.8% of total assets. Furthermore, the average number of acquisitions per firm per year is 0.184 and a firm makes as many as 34 acquisitions in a year.

[Insert Table 1 here]

3. Empirical Methodology and Results

3.1 Estimation Procedure

Tests to disentangle the financial constraint and free cash flow hypotheses require identification of over and underleveraged firms. As the capital structure theories suggest that optimum amount of debt varies across firms, such identification should depend on the deviation from the firm's target capital structure.[9] I follow previous studies (e.g., Fama and French (2002)) to utilize a two-step estimation procedure. First, I estimate the target capital structure by regressing market leverage on determinants of capital structure (X_i) used in previous studies in equation 1.[10] These determinants include proxies for profitability, size, growth opportunities, product uniqueness and tangible assets ratio. In order to control for industry effects, changes in

[9] For example, Jensen (1986, p.328) states: "The (free cash flow) theory implies managers of firms with unused debt borrowing power (i.e. financing slack)… are more likely to undertake low-benefit or even value-destroying mergers." The unused debt capacity is excess of the optimum amount of debt which is determined by the future growth opportunities, asset types and tax gains (see, e.g., Rajan and Zingales, 1995; Titman and Wessels, 1988) as well as by industry characteristics (Frank and Goyal, 2009).Thus, a firm may be overleveraged while another may be underleveraged even if the two firms have the same debt ratios.

[10] I test the robustness of these findings using *Book Leverage Deficit* and *Net Market Leverage Deficit* constructs which are residuals of regressions of *Book Leverage* and *Net Market Leverage* on the determinants of the target debt ratio in equation 1. The results hold for these alternative definitions of leverage deficit and are available upon request.

tax rates and macroeconomic changes over years, the regression includes year dummies and industry dummies based on 3-digit SIC industry groupings.[11] The fitted value of this regression is defined as the target leverage ratio. From this variable, I construct a leverage deficit variable defined as actual debt minus the estimated target leverage from the first stage.

$$\textit{Market Leverage}_{it} = \gamma' X_{i,t-1} + \varepsilon_{1i} \tag{1}$$

In the second stage, the leverage deficit variable is then used in an estimation of likelihood of making an acquisition, the ratio of transaction value to total assets and the method of payment in equations 2, 3 and 4. In addition, I test whether leverage deficit of the acquirer affects premiums paid to target and acquisition announcement returns in equations 5 and 6. I follow Officer (2003) and define *Acquisition Premium* as the ratio of value of components of the offer (i.e., aggregate value of cash, stock and other securities) to the market value of target 40 days prior to the announcement date. Following Fuller et al. (2002), I use cumulative abnormal returns to bidders (*CAR*) which are calculated over a five-day event window (two days before and two days after the announcement date). The benchmark returns are the value-weighted index of returns including dividends for the combined New York Stock Exchange, American Stock Exchange and NASDAQ.

$$P(\textit{Acquirer} = 1) = \Phi(\beta_0 + \beta_1 \cdot \textit{Leverage Deficit} + \beta_1 \cdot Z_i) \tag{2}$$

$$\textit{Total M\&A Transaction/TA} = \alpha_0 + \alpha_1 \cdot \textit{Leverage Deficit} + \alpha_1 \cdot Z_i + \varepsilon_{2i} \tag{3}$$

$$\textit{P(All Cash=1)} = \alpha_0 + \alpha_1 \cdot \textit{Leverage Deficit} + \alpha_1 \cdot Z_i + \varepsilon_{2i} \tag{4}$$

$$\textit{Acquisition Premium} = \alpha_0 + \alpha_1 \cdot \textit{Leverage Deficit} + \alpha_1 \cdot Z_i + \varepsilon_{2i} \tag{5}$$

$$CAR_i = \theta_0 + \theta_1 \cdot \textit{Leverage Deficit} + \theta_1 \cdot Z_i + \varepsilon_{3i} \tag{6}$$

[11] The results are qualitatively similar when I use Fama-French industry definitions.

3.2 Determinants of the Target Leverage Ratio

In this section, I examine the determinants of target leverage ratio and estimate the leverage deficit. Following the standard methodology in the target capital structure literature, the target leverage regression in equation (1) controls for profitability, size, growth opportunity, product uniqueness and tangible assets ratio (see Rajan and Zingales (1995); Hovakimian et al. (2001)).

Large firms are more diversified and have less volatile cash flows. This decreases financial distress cost and increases target leverage ratio (Rajan and Zingales (1995)). Furthermore, they have easy access to capital markets. In order to capture the effect of firm size on the target capital structure, I include the natural logarithm of net sales in the regression. Growth opportunities of a firm also affect its target capital structure. As Myers (1977) indicates, debt overhang may prevent firms from investing in positive future NPV projects. In particular, this effect is costly for growth firms. Furthermore, Goyal et al. (2002) show that firms in the defense industry increase their leverage ratios as their growth opportunities shrink. I use two proxies for growth opportunities: market-to-book ratio and stock return.

I use the ratio of research and development (R&D) expenditures to total assets, *RD/TA*, as a proxy for product uniqueness (Titman and Wessels (1988)). Product uniqueness of a firm increases financial distress cost, thereby decreasing the target leverage ratio. Another important determinant of target leverage ratio is asset tangibility. Firms with liquid assets are more likely to borrow against their assets and have lower bankruptcy cost resulting in a higher target leverage ratio (Titman and Wessels (1988)). I use the ratio of tangible assets to the book value of total

assets as a proxy for asset tangibility. In this paper, profitability is proxied by earnings before taxes, preferred dividends and interest payments over total assets, *EBITDA/TA*.

Table 2 summarizes coefficient estimates of the target leverage ratio regression and reports p-values based on standard errors which are corrected for heteroskedasticity and for clustering by firms. The estimates are consistent with those found in previous studies. The target capital structure increases with sales (Hovakimian et al. (2001)), and decreases with the market to book ratio (Frank and Goyal (2009)). The target debt ratio is negatively associated with profitability (Fama and French (2002)), R&D expenses (Titman and Wessels (1988)) and stock return (Hovakimian et al. (2001)). I find a positive association between tangible assets and market leverage (Rajan and Zingales (1995)).

[Insert Table 2 here]

3.3 The Second Stage Analysis

3.3.1 Does leverage deficit affect acquisition decisions?

This section presents evidence that relates a firm's leverage deficit to its acquisition activity. Table 3 reports the mean values for acquisition variables for firm-per-year in the sample by market leverage quartiles and standard errors to estimate the significance of the difference is robust-clustered by firm. Firms in the fourth (first) quartile have the largest (lowest) leverage deficit and are defined as overleveraged (underleveraged). Table 3 indicates difference acquisition choices across overleveraged and underleveraged firms. Unconditional probability of acquiring a target is 14.9% for the underleveraged sub-sample whereas it is only 8.8% for the overleveraged firms. The difference is 6.2% ($p<0.01$) and corresponds to 45.6% relative to

unconditional probability of being an acquirer (13.6%). Similarly, overleveraged firms are less likely to acquire another firm (3.7% vs. 6.8%) and to acquire assets (5.8% vs. 9.7%). This relationship continues to hold for within- (4.8% vs. 7.7%) and cross-industry acquisitions (4.5% vs. 8.6%).

[Insert Table 3 here]

In addition, Table 3 documents that the per-year value of a firm's acquisitions as a percentage of its total assets is also smaller in the subsample of overleveraged firms relative to that of underleveraged firms (2.5% vs. 4.3%). The difference is 57.4% relative to the average ratio of transaction value to total assets in the sample (3.8%). Similarly, overleveraged firms acquire smaller firms (1.2% vs. 2.2%) and smaller assets (0.9% vs. 1.5%). I also find smaller transactions of overleveraged firms for within- (1.1% vs. 1.8%) and cross-industry (0.9 vs. 1.7%) acquisition groupings. It is important to note that the relationship between leverage deficit and acquisitiveness is non-linear. Firms in the second quartile attain the highest acquisitiveness ratios while the sub-sample of overleveraged firms has the lowest acquisitiveness measures of all groups.

The univariate evidence on the negative association between leverage deficit and acquisition measures does not account for several important factors that affect the likelihood of making an acquisition. Therefore, I conduct multivariate analysis which controls for firm and industry characteristics considered in previous studies. Large firms are more likely to make acquisitions (Almazan et al. (2009)) as they are more diversified which enables them to raise capital on short notice to finance acquisitions. Thus, I include the natural logarithm of sales to

control for firm size. As better performing firms are more likely to make acquisitions (Harford (1999)), I add both stock price (*Stock return*) and accounting performance measures (*EBITD/TA*). While the *Market-to-book ratio* variable proxies for growth opportunities in the multivariate regression, it may also indicate overvaluation of equity which may increase the likelihood of making acquisitions (Shleifer and Vishny (2003)). In order to control for the liquidity of the market for corporate assets within an industry (e.g., M&A wave), I include the *Industry M&A Liquidity* construct of Schlingemann et al. (2002). Firms in a highly concentrated industry have fewer targets available for acquisitions within the industry, which may limit within-industry acquisitions while enhancing the likelihood of cross-industry acquisitions. Therefore, the *Herfindahl Index* is included in the analysis. The analysis also includes year dummies to account for macroeconomic changes in the time series.

I use the probit analysis to estimate the likelihood of making an acquisition and report marginal effects of the probit model as the probit coefficient estimates are hard to interpret. Marginal effects of continuous variables are found at their means, while marginal effects of dummy variables are calculated through the difference in the cumulative distribution functions for discrete changes of dummy variables from zero to one. I implement tobit analysis to estimate the ratio of sum of acquisition value to the firm's total assets, since the dependent variable is censored at zero. The p-values in both probit and tobit analyses are based on standard errors corrected for clustering by firm.

Table 4 presents probit analysis in odd-numbered models and tobit analysis in even-numbered models. Both analyses show significant effects of leverage deficit on acquisitions. A one standard deviation (0.188) increase in leverage deficit decreases the probability of making an acquisition by 10.8% (Model 1) and decreases the ratio of total transaction value to total assets

by 5.2% (Model 2). I continue to find significant effects of leverage deficit on firm and asset acquisitions as well as on within- and cross-industry acquisitions. These findings substantiate the view that leverage deficit affects acquisition decisions.

[Insert Table 4 here]

Next, I study the reason for this phenomenon. On the one hand, the free cash flow hypothesis predicts that underleveraged firms are more likely to make acquisitions relative to a control group of firms that do not deviate from their target capital structures. On the other hand, the financial constraint hypothesis suggests lower acquisition activity relative to this control group. In order to disentangle the effects of free cash flow and financial constraints, Table 5 includes dummy variables for overleveraged and underleveraged firms in the probit and tobit analyses. The effect of overleverage is statistically and economically significant, whereas that of underleverage is not. Overleveraged firms are 4.4% less likely to make an acquisition, a decrease of 32.4% over the sample average (Model 1). They are also less likely to acquire another firm (1.8%) and assets (3.0%). The negative effect of overleverage is robust for both within (2.0%) and cross-industry acquisitions (2.8%). Consistent with the lower likelihood of acquisition, they also have a smaller volume of transactions relative to total assets. The volume is smaller by 12% in firm acquisitions and 6.8% in asset acquisitions. These findings continue to be true for within- and cross-industry acquisitions. Collectively, these findings confirm that the effect of leverage deficit on acquisitions is mainly driven by overleveraged firms and support the financial constraint hypothesis.

[Insert Table 5 here]

However, I fail to find significant effect of underleverage on acquisition measures. The effect of underleverage on likelihood of acquisition is insignificant. This is consistent with the univariate analysis, which reports that the firms in the second quartile are as acquisitive as underleveraged firms. This finding does not support the free cash flow hypothesis.

The estimates for explanatory variables are in line with previous studies. For example, the coefficient estimates for *Sales* are significant in all models, confirming that large firms are more likely to be acquirers (Harford (1999)). Firms with higher market-to-book are also more likely to make acquisitions (Cai and Vijh (2007)). Furthermore, performance measures (*Stock Return* and *EBITD/TA*) are positively associated with likelihood of acquisitions (Almazan et al. (2009)). *Industry M&A Liquidity* and *Herfindahl Index* have a positive and a negative effect, respectively, on within-industry acquisitions although these variables do not have explanatory power on the likelihood of cross-industry acquisitions. This suggests strong influence of industry structure on within industry acquisition decisions while industry characteristics do not affect cross-industry acquisitions.

3.3.2 Does leverage deficit affect method of payment?

This section presents evidence relating leverage deficit to financing decisions in acquisitions. Table 6 reports probit analysis of the likelihood of all-cash offer in odd-numbered columns, and even-numbered columns are tobit analysis on percentage of cash used in the offer. The p-values are calculated based on standard errors that are corrected for heteroskedasticity and for clustering by firm. Previous studies show a number of factors influencing the method of

payment in acquisitions including asymmetric information (Hansen (1987); Travlos (1987); Eckbo et al. (1990)), competition for the target (Berkovitch and Narayanan (1990)), growth opportunities (Martin (1996)), agency problems (Bruner (1988)), and stock overvaluation (Shleifer and Vishny (2003)). Therefore, the regressions include several acquirer (e.g., size, profitability, stock return and market-to-book ratio), target (e.g., relative deal size and target's organizational form), deal (e.g., dummy variables for within-industry acquisitions and multiple bidders) and industry characteristics (e.g., *Industry M&A Liquidity* and *Herfindahl Index*). Furthermore, I add year dummies in the regressions to account for macroeconomic changes in the time series.

[Insert Table 6 here]

The results in Table 6 indicate that leverage deficit significantly affect method of payment. A one standard deviation increase in leverage deficit decreases the likelihood of all-cash offer by 15.9% (Model 1) and the percentage of cash in the deal by 2.5 percent (Model 2). The significant effect of leverage deficit variable transcends to both firm and asset acquisitions: A one standard deviation increase in leverage deficit decreases the likelihood of all-cash offer by 21.6% in firm acquisitions and 9.5% in asset acquisitions. Models 3 and 4 report the effects of overleveraged and underleveraged variables on method of payments. Overleveraged firms are 6.9% less likely to offer an all-cash deal, a decrease of 23.1% over the sample average. Furthermore, they have 5.1% less cash in their offers. The effects of underleverage on percentage of cash and likelihood of all-cash offer are positive, but lack statistical significance. I also find negative and significant effects of overleverage on likelihood of all-cash offer in firm

acquisitions (-9.9%) and asset acquisitions (-3.9%) while underleverage does not have statistically significant estimates in these regressions.

Collectively, these findings indicate that leverage deficit influences the method of payment. The effect is mainly driven by overleveraged firms reducing the cash component in their acquisition deals. Furthermore, underleveraged firms do not necessarily offer a higher fraction of cash in their deals. Overall, these findings suggest that difficulty in raising capital for acquisitions, rather than ease of issuing debt, plays an important role in how acquirers structure their deals.

Findings confirm that large firms are more likely to offer all-cash deals as they have more stable cash flows and have better access to debt markets (Titman and Wessels (1984)). Profitable firms also use a higher percentage of cash in their offers. Firms sweeten the deals by including a larger fraction of cash when there are multiple bidders for the target. This finding is in line with strategic use of cash in acquisitions to deter potential bidders (Berkovitch and Narayanan (1990)). Consistent with positive effects of growth opportunities (e.g., Martin (1996)) and stock overvaluation (e.g., Shleifer and Vishny (2003)) on all-stock acquisitions, firms are less likely to make all-cash offers when they have higher market-to-book ratios and higher stock returns. Acquirers are more likely to use stock when their industries have high M&A liquidity. This is in line with the increase in the all-stock offers during merger waves (Harford (2005)). Firms undertaking within-industry asset acquisitions are more likely to use stock. Relative transaction size decreases the likelihood of all-cash offers in firm acquisitions confirming that large targets are less likely to be acquired with cash as it is difficult to raise debt to finance large transactions. However, the relative size variable has a positive effect on the percentage of cash in asset

acquisitions. This is consistent with the view that the effect of seller's information about the asset on the method of payment increases with the relative size of the asset (Hege et al. (2009))

3.3.3 Does leverage deficit affect premiums paid to targets?

The free cash flow hypothesis suggests that managers of underleveraged firms are more likely to overpay in acquisitions while the financial constrain hypothesis predicts lower premiums for overleveraged acquirers. As the premium data are only available for the sub-sample of public firm acquisitions, I test these predictions for this sub-sample.

I follow Officer (2003) to construct the *Acquisition Premium* variable which is the aggregate value of cash, stock and other securities offered to the target divided by the market capitalization of the target 40 days prior to the announcement. Consistent with Officer (2003), I truncate the variable between zero and two. I also use cumulative abnormal returns to the target firm (*Target CAR*) over the period starting 20 days prior to the announcement to 1 day after the announcement day to assess the premium paid to the target.[12] In addition to control variables used in previous sections, the premium regressions account for market-to-book ratio, stock return and profitability of the target firm. Table 7 reports the insignificant effects of leverage deficit on the acquisition premium and *Target CAR*. However, the effect of leverage deficit becomes significant when I disentangle the effects of overleveraged and underleveraged firms. Specifically, overleveraged acquirers pay 8.3% lower premiums ($p<0.05$), whereas the estimate for underleveraged firm is not statistically different from zero ($p>0.1$) in Model 2. The negative effect of overleverage on *Target CAR* in Model 4 also confirms that overleverage constrains

[12] Hartzell et al.(2004) also use 21-day event window (-20,+1) to assess the target premium. The results are qualitatively similar when I use Target CAR(-15,+1) and Target CAR(-10,+1). These results are not reported, but are available upon request.

firms from paying high premiums. This finding and a low likelihood of all-cash offers for overleveraged acquirers reported in Table 6 jointly suggest that overleveraged firms' resorting to equity offers in acquisitions does not generate premiums as large as other firms. Furthermore, the lower premium associated with overleveraged firms is consistent with their lower probability of making the acquisitions documented in Table 5. These findings are in line with the financial constraint hypothesis, but do not support the free cash flow hypothesis.

[Insert Table 7 here]

3.3.4 Does leverage deficit affect abnormal announcement returns?

In previous sections, I showed that overleveraged firms pay lower premiums and are less likely to make acquisitions. In this section, I examine the effect of leverage deficit on *CAR* to acquirer to assess whether capital markets recognize leverage deficit in response to acquisition announcements. I follow prior literature and control for acquirer, target, deal and industry characteristics.[13] Table 8 reports the coefficient estimates of regressions of *CAR* on leverage deficit, annual dummies and control variables. The models have R^2 of 3.8% for acquisitions, 6.2% for firm acquisitions and 3.8% for asset acquisitions. These are comparable to *CAR* regressions in previous studies.[14] The p-values are calculated based on White's (2009) correction for heteroskedasticity and incorporate clustering of acquirers.

Table 8 reports that the coefficients of leverage deficit are positive and significant in all models. Specifically, CARs to acquirers increase by 42 basis points in response to a one standard

[13] See, e.g., Andrade et al.(2001) and Fuller et al.(2002) for review factors influencing announcement returns.
[14] Masulis et al. (2007), for instance, report R^2 in CAR regressions ranging from 4.2 to 8 percent. The R^2 in Moeller et al (2004) takes values between 5.2% and 5.5 percent.

deviation increase in leverage deficit, an increase of 29.4% over the sample average (Model 1). Such an increase in leverage deficit also increases *CAR* to acquirer in firm acquisitions by 60 basis points (Model 5) and that of asset acquirers by 45 basis points (Model 9).

[Insert Table 8 here]

As leverage deficit is negatively associated with acquisition probability, investors may use ex ante leverage deficit to form expectations on the likelihood of acquisitions. As a result, stock prices of firms with low probabilities of undertaking acquisitions (e.g., overleveraged firms) are less likely to incorporate potential valuation effects of acquisitions prior to announcement dates and are more likely to reflect the investors' valuations on acquisitions at the announcement dates relative to firms with a higher likelihood of being an acquirer. This, in turn, may generate systematic differences in stock returns to firms at the acquisition announcement dates based on their leverage deficit. In order to correct for investor anticipation effect, I use the methodology in Harford (1999) which classifies firms as expected and unexpected bidders. Such classification allows me to identify the effects of leverage deficit on stock prices for unexpected overleveraged and underleveraged bidders. Following Harford (1999), I construct intervals in increments of 0.01 from zero to maximum expected probability based on the probit model in Table 4 and calculate the percentages of bidders and non-bidders for each interval. This procedure generates two distributions of bidder and non-bidder percentages between zero and maximum expected probability, and the crossover point of the two distributions indicates the cutoff point for expected bidders. Firms having greater predicted probability than the cutoff point are categorized as expected bidders, and those with lower probabilities are considered as

unexpected bidders. The cutoff point for expected acquirers is 0.13. I also calculate cut-off probabilities for acquirers of firms (0.06) and assets (0.09). Model 3 reports that leverage deficit coefficient for an unexpected bidder is positive and significant. There are also positive and significant effects of leverage deficit on CAR in subsamples of firm and asset acquisitions when the firm is unexpected firm and unexpected asset bidder, respectively. These findings substantiate the view that investors take leverage deficit in consideration in evaluating acquisitions.

Next, I examine whether there are differences in market reactions to underleveraged and overleveraged acquirers relative to moderately leveraged firms. The free cash flow hypothesis suggests negative market reaction to underleveraged acquirers, whereas the financial constraint hypothesis predicts positive market reaction to overleveraged acquirers. As debt does not prevent managers from undertaking poor acquisitions when it is excessive (Zwiebel (1996)), the free cash flow hypothesis does not imply positive market reaction to overleveraged acquirers. Model 2 reports that *CAR* to overleveraged acquirers is 110 basis points higher relative to moderately leveraged acquirers ($p<0.01$) while the *Underleveraged Firm* variable is not significant. The effects of overleverage on *CAR* are also significant for sub-samples of firm and asset acquisitions, whereas underleverage has an insignificant effect on *CAR*. I also find significant the effect of overleverage when the firm is an unexpected bidder in Model 4.[15] To the extent that the effect of expected bids is already incorporated in stock prices, this finding suggests that our previous estimate of overleverage conservatively predicts the market reaction. Nevertheless, the effect of underleverage continues to be insignificant for unexpected bidders.

[15] In unreported analysis, I replicate Model 3 for the sub-sample of unexpected bidders and continue to find significant effect of overleverage and insignificant effect of underleverage on *CAR*.

Finally, I address the endogenity of payment method in the CAR regression. As leverage deficit affects the method of payment, the *All Cash* variable is endogenous in the regression. Since *Industry M&A Liquidity* is negatively associated with *All Cash* (Table 6) and does not have significant effect on *CAR* (Table 8), I use it as an instrument for *All Cash* in the *CAR* regression.[16] While the effect of overleverage on *CAR* continues to be positive and significant ,underleverage is not significantly associated with *CAR*.[17] Overall, the significant effect of overleverage and insignificant effect of underleverage on *CAR* reported in Table 8 lend support to the financial constraint hypothesis but are not in line with the free cash flow hypothesis.

Our results are consistent with previous studies. I confirm a result reported by Moeller et al. (2004) with our finding that *CAR* decreases with firm size. Furthermore, *CAR* is negatively associated with the *market-to-book* ratio[18] (Masulis et al. (2007)) and the public status of the target (Fuller et al. (2002)). There is a positive association between *CAR* and relative deal size which is consistent with (Asquith et al. (1983)).

3.3.5 Capital structure adjustments prior to acquisitions

Lastly, I study adjustments to capital structures in anticipation of acquisitions. Morellec and Zhdanov (2008) suggest that future acquisition opportunities will affect ex ante capital structure decisions. Specifically, firms with a higher likelihood of acquisitions are more likely to reduce their ex ante leverage deficits. Therefore, I examine leverage adjustments for firms with a high likelihood of acquisitions.

[16] This CAR regression excludes the *Industry M&A Liquidity* variable as the variable is used as an instrument for *All Cash*.
[17] This result is not reported, but is available upon request.
[18] This is also consistent with Rau and Vermaelen (1998) who find that firms with high market-to-book ratios have poor post-acquisition performance.

Table 9 presents evidence that overleveraged firms reduce their debt ratios and move toward their debt ratios when they anticipate high likelihood of acquisitions. Specifically, they reduce debt ratio by 1.7% and leverage deficit by 4.6% prior to acquisition announcement. Industry adjusted changes in leverage deficit is also significant. In fact, underleveraged increase their debt ratios. This finding is in line with the result that leverage deficit does not affect the acquisition measures and deal terms for underleveraged firms (as reported in Model 2 of Table 5). Hence, they are more likely to take advantage of tax benefits of debt prior to acquisitions.

[Insert Table 9 here]

3.3.6 Robustness

This section examines alternative explanations for the findings reported in the paper. Leverage deficit may proxy for financial synergies, which are generated in acquisitions of low financial slack firms by high slack companies (Myers and Majlus (1984)). This hypothesis suggests a high (low) likelihood of acquisition for underleveraged (overleveraged) firms. To the extent that financial synergies are realized, this hypothesis also implies a positive relationship between underleverage and CAR. Although I find negative association between overleverage and the probability of undertaking an acquisition, I fail to find support for a high likelihood of acquisition for underleveraged firms. Furthermore, there is no significant positive effect of underleverage on CAR. Therefore, findings do not support the financial synergies hypothesis.

It is also possible that transfer wealth from shareholders to bondholders may make acquisitions more valuable to underleveraged firms (Maquieira, Megginson and Nail (1998)).

Therefore, managers of overleveraged firms, assuming they behave in the best interest of shareholders, may shy away from acquisitions. In addition to predicting a low likelihood of acquisition probability for overleveraged firms, this hypothesis suggests that overleverage has a negative effect on CAR as acquisition surplus for shareholders decreases with leverage deficit. Although the findings confirm the former prediction, positive effect of overleverage on CAR reported in Table 8 is inconsistent with the latter. Therefore, findings in this paper are not in line with the wealth transfer hypothesis.

4. Conclusions

This paper sheds light on the link between a firm's deviation from its target capital structure and its acquisition choices. I find that firms that are overleveraged relative to their target leverage ratios pay lower premiums, are less likely to make acquisitions, and are less likely to use cash in their offers. Furthermore, they receive more favorable market reaction to their acquisitions. Finally, managers actively rebalance their capital structures in anticipation of acquisitions when they are overleveraged. These findings lend support to the financial constraint hypothesis, but are not in line with the free cash flow hypothesis.

This paper contributes to studies examining the role of financing frictions on corporate policies. By using acquisitions in this study, I document that overleverage limits managers in investment decisions as well as the form and the level of financing. I show that overleveraged firms are less likely to go to debt markets and are more likely to use equity to finance their acquisitions. Furthermore, using equity does not suffice for overleveraged firms to offer premiums as high as other firms. This, in turn, constrains the acquisition activity of

overleveraged firms. Therefore, this study suggests that excess positive leverage deficit not only limits the access to debt markets, but also constrains the exploitation of equity market, which, collectively, decreases the acquisition activity of overleveraged firms.

This study supports the usefulness of the target capital structure concept. It shows that the deviation from the target capital structure affects the ability to make acquisitions as well as influencing the method of payment. Furthermore, it improves our understanding on why firms adjust debt ratios more quickly when they are overleveraged (Leary and Roberts, 2005). The findings in this paper indicate that a higher likelihood of forgoing acquisition opportunities yields quicker leverage adjustments for overleveraged firms. These findings also shed some light on the role of anticipation of investment opportunities on capital structure decisions. The findings in this paper establish a link between acquisitions and security issuance decisions through leverage deficit while extending the role of leverage deficit in security issuance to real investment decisions.

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Table 1. Summary Statistics

The table reports descriptive statistics for the sample. Panel A and Panel B report firm and deal characteristics, respectively. Variable definitions are in the Data Appendix.

Panel A. Firm Characteristics

Variable	Obs	Mean	Std. Dev.	Min	Max
Total Assets ($ million)	60630	2656	14625	1	795337
Market Value ($ million)	60630	4389	22023	2	1029870
Sales	60630	5.368	1.858	2.389	10.291
Stock Return	60630	0.167	0.698	-0.833	3.568
Market-to-Book	60630	1.811	1.282	0.587	8.462
EBITD/TA	60630	0.125	0.150	-0.436	0.600
Tangible Assets /TA	60624	0.293	0.227	0.000	1.000
R&D/TA	60630	0.040	0.084	0.000	2.847
Market Leverage	60630	0.378	0.245	0.021	0.954
Market Leverage Deficit	60630	0.000	0.188	-0.696	0.948
Ratio of Acquirers	60630	0.136	0.342	0.000	1.000
Ratio of Firm Acquirers	60630	0.061	0.239	0.000	1.000
Ratio of Asset Acquirers	60630	0.089	0.285	0.000	1.000
Number of Acquisitions	60630	0.184	0.584	0.000	34.000
Number of Firm Acquisitions	60630	0.072	0.343	0.000	34.000
Number of Asset Acquisition	60630	0.112	0.424	0.000	21.000
Acquisitions Value/TA	60630	0.038	0.152	0.000	1.097
Firm Acquisitions Value/TA	60630	0.019	0.101	0.000	0.791
Asset Acquisitions Value/TA	60630	0.013	0.062	0.000	0.454

Panel B. Deal Characteristics

Variable	Obs	Mean	Std. Dev.	Min	Max
All Cash	10807	0.299	0.458	0	1
Combo	10807	0.543	0.498	0	1
All Stock	10807	0.158	0.364	0	1
Public Target	10807	0.165	0.371	0	1
Private Target	10807	0.484	0.500	0	1
Within-Industry Acquisition	10807	0.495	0.500	0	1
Firm Acquisition	10807	0.391	0.488	0	1

Table 2. Target Capital Structure Regression

This table presents the OLS estimates of target leverage ratio over key financial measures documented in the literature. The dependent variable is *Market Leverage*. P-values are reported in parenthesis and are based on standard errors corrected for heteroskedasticity and for clustering by firm. Variable Definitions are in Data Appendix. **, * and + stand for statistical significance at the 1%, 5% and 10% levels, respectively.

	Market Leverage
Sales	0.012**
	(0.000)
Market-to-Book	-0.053**
	(0.000)
R&D Missing Dummy	0.025**
	(0.000)
R&D/TA	-0.414**
	(0.000)
EBITD/TA	-0.356**
	(0.000)
Tangible Assets/TA	0.049**
	(0.000)
Stock Return	-0.036**
	(0.000)
Year FE	Yes
Industry FE	Yes
R-squared	0.407

Table 3. Firm Characteristics by Market Leverage Deficit Quartiles

This table reports means of key variables of 60,630 firm-years recorded in the COMPUSTAT between 1990 and 2007. The p-values are for differences of means test from the first to the fourth quartile. Variable definitions are in the Data Appendix. **, * and + stand for statistical significance at the 1%, 5% and 10% levels, respectively.

	Whole sample	Leverage Deficit Quartiles					
		1 (Lowest)	2	3	4 (Largest)	1-4	p-value
Ratio of Acquirers	0.136	0.149	0.165	0.141	0.088	0.062	0.000 **
Ratio of Firm Acquirers	0.061	0.068	0.076	0.062	0.038	0.030	0.000 **
Ratio of Asset Acquirers	0.089	0.097	0.108	0.093	0.058	0.040	0.000 **
Ratio of Within-Industry Acquirers	0.072	0.077	0.086	0.075	0.048	0.029	0.000 **
Ratio of Cross-Industry Acquirers	0.075	0.086	0.093	0.076	0.045	0.040	0.000 **
Ratio of Public Acquirers	0.027	0.030	0.035	0.028	0.015	0.015	0.000 **
Acquisitions Value/TA	0.038	0.043	0.046	0.037	0.025	0.018	0.000 **
Firm Acquisitions Value/TA	0.019	0.022	0.023	0.018	0.012	0.009	0.000 **
Asset Acquisitions Value/TA	0.013	0.015	0.016	0.014	0.009	0.006	0.000 **
Within-Industry Acquisitons Value/TA	0.016	0.018	0.019	0.017	0.011	0.007	0.000 **
Cross-Industry Acquisitions Value/TA	0.015	0.017	0.019	0.014	0.009	0.008	0.000 **
Public Acquisitions Value/TA	0.007	0.008	0.009	0.008	0.004	0.004	0.000 **

Table 4. Does Leverage Deficit Affect Acquisition Decisions?

Table presents probit analysis in odd-numbered models and tobit analysis in even-numbered models. The dependent variable in probit models takes value one if the firm undertakes an acquisition, and tobit analysis estimates the ratio of sum of acquisition value to the firm's total assets. Variable definitions are in the Data Appendix. The p-values are given in parenthesis and are adjusted for standard errors clustered by firm. All models include year dummies. **, * and + stand for statistical significance at the 1%, 5% and 10% levels, respectively.

	All Acquisitions		Firm Acquisitions		Asset Acquisitions		Within-Industry Acquisitions		Cross-Industry Acquisitions	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Market Leverage Deficit	-0.108**	-0.275**	-0.048**	-0.290**	-0.071**	-0.144**	-0.047**	-0.174**	-0.071**	-0.227**
	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*
Sales	0.012**	0.019**	0.009**	0.046**	0.006**	0.004*	0.006**	0.015**	0.008**	0.018**
	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.025)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*
Stock Return	0.020**	0.065**	0.010**	0.070**	0.014**	0.033**	0.010**	0.044**	0.014**	0.048**
	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*
Market-to-Book	0.010**	0.036**	0.010**	0.067**	0.000	-0.000	0.006**	0.028**	0.004**	0.017**
	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.943)*	*(0.916)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*
EBITD/TA	0.151**	0.411**	0.043**	0.257**	0.125**	0.287**	0.091**	0.364**	0.069**	0.235**
	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*
Industry M&A Liquidity	0.311**	0.787**	0.135**	0.804**	0.224**	0.451**	0.303**	1.150**	0.002	-0.025
	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.927)*	*(0.777)*
Herfindahl Index	-0.072**	-0.188**	-0.042**	-0.257**	-0.043**	-0.084**	-0.095**	-0.378**	0.005	0.029
	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.543)*	*(0.313)*
Observations	60630	60630	60630	60630	60630	60630	60630	60630	60630	60630
Pseudo R-square	0.040		0.050		0.032		0.045		0.033	
P-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 5. Disentangling the Effects of Underleverage and Overleverage on Acquisitions

Table presents probit analysis in odd-numbered models and tobit analysis in even-numbered models. The dependent variable in probit models takes value one if the firm undertakes an acquisition, and tobit analysis estimates the ratio of sum of acquisition value to the firm's total assets. Variable definitions are in the Data Appendix. The p-values are given in parenthesis and are adjusted for standard errors clustered by firm. All models include year dummies. **, * and + stand for statistical significance at the 1%, 5% and 10% levels, respectively.

	All Acquisitions		Firm Acquisitions		Asset Acquisitions		Within-Industry Acquisitions		Cross-Industry Acquisitions	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Underleveraged Firm Dummy	-0.001	-0.005	0.000	0.000	-0.001	-0.005	-0.001	-0.005	0.001	0.001
	(0.859)	*(0.627)*	*(0.963)*	*(0.976)*	*(0.780)*	*(0.461)*	*(0.730)*	*(0.638)*	*(0.607)*	*(0.907)*
Overleveraged Firm Dummy	-0.044**	-0.122**	-0.018**	-0.120**	-0.030**	-0.068**	-0.020**	-0.080**	-0.028**	-0.098**
	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*
Sales	0.012**	0.018**	0.009**	0.045**	0.006**	0.003+	0.006**	0.014**	0.008**	0.017**
	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.076)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*
Stock Return	0.022**	0.072**	0.011**	0.077**	0.015**	0.036**	0.011**	0.049**	0.015**	0.053**
	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*
Market-to-Book	0.010**	0.037**	0.010**	0.068**	0.000	0.000	0.006**	0.028**	0.005**	0.017**
	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.756)*	*(0.884)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*
EBITD/TA	0.147**	0.399**	0.041**	0.248**	0.122**	0.279**	0.089**	0.356**	0.066**	0.226**
	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*
Industry M&A Liquidity	0.304**	0.768**	0.132**	0.784**	0.219**	0.441**	0.299**	1.137**	-0.002	-0.039
	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.951)*	*(0.661)*
Herfindahl Index	-0.070**	-0.181**	-0.041**	-0.249**	-0.041**	-0.080**	-0.094**	-0.373**	0.007	0.034
	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.431)*	*(0.230)*
Observations	60630	60630	60630	60630	60630	60630	60630	60630	60630	60630
Pseudo R-square	0.040		0.050		0.032		0.045		0.033	
P-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 6. Does Leverage Deficit Affect the Method of Payment?

Table presents probit analysis in odd-numbered models and tobit analysis in even-numbered models. The dependent variable in probit models is All-Cash, and tobit analysis estimates the percentage of cash in the acquisition offer. The p-values in both probit and tobit analyses are based on standard errors corrected for clustering by firm. Variable definitions are in the Data Appendix. All models include year dummies. **, * and + stand for statistical significance at the 1%, 5% and 10% levels, respectively.

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	All Acquisitions				Firm Acquisitions				Asset Acquisitions			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Market Leverage Deficit	-0.159**	-13.327**			-0.216**	-17.879**			-0.095*	-7.042+		
	(0.000)	*(0.000)*			*(0.000)*	*(0.000)*			*(0.012)*	*(0.081)*		
Overleveraged Firm			-0.069**	-5.095**			-0.099**	-8.073**			-0.039*	-2.257
			(0.000)	*(0.001)*			*(0.000)*	*(0.000)*			*(0.018)*	*(0.204)*
Underleveraged Firm			0.003	0.559			0.001	-0.175			0.001	0.437
			(0.799)	*(0.620)*			*(0.967)*	*(0.911)*			*(0.947)*	*(0.767)*
Sales	0.009**	1.095**	0.008**	1.032**	-0.004	0.510	-0.005	0.429	0.021**	1.916**	0.020**	1.884**
	(0.003)	*(0.002)*	*(0.010)*	*(0.003)*	*(0.385)*	*(0.315)*	*(0.237)*	*(0.396)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*
Relative Size	-0.035**	0.473	-0.035**	0.467	-0.065**	-2.957**	-0.065**	-2.958**	-0.005	3.655**	-0.005	3.650**
	(0.000)	*(0.192)*	*(0.000)*	*(0.198)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.229)*	*(0.000)*	*(0.219)*	*(0.000)*
Market-to-Book	-0.006+	-2.211**	-0.005	-2.148**	-0.020**	-3.674**	-0.019**	-3.628**	0.015**	0.640	0.016**	0.695
	(0.096)	*(0.000)*	*(0.166)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.002)*	*(0.218)*	*(0.001)*	*(0.181)*
EBITD/TA	0.228**	17.638**	0.220**	17.097**	0.379**	26.192**	0.373**	25.649**	0.097*	6.061	0.091+	5.702
	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.037)*	*(0.222)*	*(0.050)*	*(0.249)*
Stock Return	-0.032**	-2.490**	-0.029**	-2.219**	-0.006	-0.480	-0.000	0.034	-0.046**	-3.593**	-0.044**	-3.467**
	(0.000)	*(0.000)*	*(0.000)*	*(0.001)*	*(0.566)*	*(0.577)*	*(0.964)*	*(0.969)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*
Within-Industry Acquisition	-0.016+	-2.088*	-0.017+	-2.142*	-0.019	-1.248	-0.019	-1.312	-0.015	-2.779*	-0.016	-2.806*
	(0.074)	*(0.047)*	*(0.066)*	*(0.041)*	*(0.157)*	*(0.418)*	*(0.153)*	*(0.389)*	*(0.205)*	*(0.031)*	*(0.196)*	*(0.030)*
Public Target	-0.036**	-3.027+	-0.035*	-2.935+	0.068**	3.327	0.067**	3.325	-0.109+	1.069	-0.109+	0.993
	(0.008)	*(0.059)*	*(0.010)*	*(0.068)*	*(0.002)*	*(0.137)*	*(0.002)*	*(0.139)*	*(0.065)*	*(0.862)*	*(0.066)*	*(0.872)*
Private Target	-0.106**	-5.541**	-0.106**	-5.510**	-0.092**	-8.205**	-0.093**	-8.226**	-0.083**	-2.124+	-0.082**	-2.098+
	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.083)*	*(0.000)*	*(0.088)*
Competed	0.208**	21.356*	0.207**	21.285*	0.233**	23.845**	0.231**	23.601**	0.032	11.417	0.037	11.686
	(0.000)	*(0.023)*	*(0.000)*	*(0.020)*	*(0.000)*	*(0.008)*	*(0.000)*	*(0.006)*	*(0.777)*	*(0.337)*	*(0.744)*	*(0.324)*
Industry M&A Liquidity	-0.201**	-17.301*	-0.208**	-17.835*	-0.236*	-14.357	-0.254*	-15.518+	-0.199*	-21.086*	-0.203*	-21.365*
	(0.004)	*(0.028)*	*(0.003)*	*(0.022)*	*(0.021)*	*(0.115)*	*(0.013)*	*(0.088)*	*(0.033)*	*(0.048)*	*(0.030)*	*(0.043)*
Herfindahl Index	-0.025	0.210	-0.022	0.492	-0.002	7.850	0.007	8.649+	-0.035	-3.435	-0.034	-3.339
	(0.393)	*(0.947)*	*(0.460)*	*(0.875)*	*(0.968)*	*(0.132)*	*(0.874)*	*(0.093)*	*(0.353)*	*(0.364)*	*(0.371)*	*(0.377)*
Observations	10807	10807	10807	10807	4221	4221	4221	4221	6586	6586	6586	6586
(Pseudo) R-square	0.067	0.070	0.067	0.069	0.146	0.160	0.148	0.160	0.042	0.048	0.042	0.048

Table 7. Does Leverage Deficit Affect Premiums Paid to Targets?

The table reports regression estimates for Acquisition Premium and Target CAR(-20,+1). The p-values are based on standard errors corrected for heteroskedasticity and for clustering by firm. Variable definitions are in the Data Appendix. All models include year dummies. **, * and + stand for statistical significance at the 1%, 5% and 10% levels, respectively.

	Acquisition Premium		Target CAR(-20,+1)	
	(1)	(2)	(3)	(4)
Market Leverage Deficit	0.018		0.013	
	(0.841)		*(0.832)*	
Overleveraged Firm		-0.083*		-0.054*
		(0.037)		*(0.024)*
Underleveraged Firm		-0.035		-0.020
		(0.164)		*(0.293)*
Sales	0.007	0.005	0.014**	0.013**
	(0.286)	*(0.470)*	*(0.004)*	*(0.010)*
Market-to-Book	0.050**	0.053**	0.026**	0.027**
	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*
EBITD/TA	-0.082	-0.071	0.100	0.106
	(0.495)	*(0.554)*	*(0.201)*	*(0.178)*
Stock Return	0.012	0.008	-0.023	-0.026+
	(0.545)	*(0.684)*	*(0.122)*	*(0.090)*
Within-Industry Acquisition	-0.012	-0.013	-0.015	-0.015
	(0.612)	*(0.585)*	*(0.376)*	*(0.362)*
All Cash	0.037	0.032	0.099**	0.095**
	(0.101)	*(0.161)*	*(0.000)*	*(0.000)*
Competed	0.014	0.021	-0.080**	-0.075**
	(0.750)	*(0.637)*	*(0.005)*	*(0.009)*
Hostile	0.135**	0.143**	-0.003	0.001
	(0.009)	*(0.007)*	*(0.946)*	*(0.980)*
Industry M&A Liquidity	-0.161	-0.167	-0.034	-0.041
	(0.280)	*(0.261)*	*(0.773)*	*(0.733)*
Herfindahl Index	-0.051	-0.048	0.103	0.107
	(0.525)	*(0.554)*	*(0.147)*	*(0.134)*
Market-to-Book (Target Firm)	-0.030**	-0.031**	-0.020*	-0.020**
	(0.008)	*(0.006)*	*(0.011)*	*(0.009)*
EBITD/TA (Target Firm)	0.257**	0.259**	-0.149+	-0.150+
	(0.003)	*(0.002)*	*(0.070)*	*(0.068)*
Stock Return (Target Firm)	-0.015	-0.015	-0.034*	-0.033*
	(0.433)	*(0.431)*	*(0.019)*	*(0.024)*
Observations	1005	1005	1220	1220
R-squared	0.066	0.073	0.130	0.134

Table 8. OLS Regressions of Acquirer Returns

The table reports coefficient estimates of acquirer returns which are calculated over a five-day event window (two days before and two days after the announcement date). The benchmark returns are the value-weighted index of returns including dividends for the combined New York Stock Exchange, American Stock Exchange and NASDAQ. Variable definitions are in the Appendix. The p-values are given in parenthesis and are adjusted for heteroskedasticity and for clustering by firm. All regressions include year dummies. **, * and + stand for statistical significance at the 1%, 5% and 10% levels, respectively.

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	All Acquisitions				Firm Acquisitions				Asset Acquisitions			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Market Leverage Deficit	0.027**				0.032+				0.024*			
	(0.003)				*(0.067)*				*(0.018)*			
Overleveraged Firm		0.011**				0.019**				0.007+		
		(0.002)				*(0.009)*				*(0.063)*		
Underleveraged Firm		0.000				0.000				0.000		
		(0.886)				*(0.929)*				*(0.923)*		
Market Leverage Deficit x Surprise Offer			0.037*				0.044				0.041*	
			(0.030)				*(0.125)*				*(0.034)*	
Market Leverage Deficit x Expected Offer			0.005				-0.003				0.008	
			(0.594)				*(0.865)*				*(0.480)*	
Overleveraged x Surprise Offer				0.016*				0.027*				0.013*
				(0.011)				*(0.027)*				*(0.032)*
Overleveraged x Expected Offer				0.000				0.001				-0.002
				(0.920)				*(0.889)*				*(0.700)*
Underleveraged x Surprise Offer				0.003				0.010				0.000
				(0.598)				*(0.216)*				*(0.948)*
Underleveraged x Expected Offer				0.001				-0.001				0.000
				(0.730)				*(0.784)*				*(0.915)*
Surprise Offer			0.010**	0.007+			0.020**	0.011			0.001	0.000
			(0.003)	*(0.077)*			*(0.000)*	*(0.113)*			*(0.742)*	*(0.960)*
Sales	-0.002**	-0.002*	-0.001	-0.001	-0.004**	-0.004**	-0.002	-0.002	-0.000	-0.000	-0.000	0.000
	(0.010)	*(0.019)*	*(0.150)*	*(0.218)*	*(0.001)*	*(0.001)*	*(0.126)*	*(0.122)*	*(0.822)*	*(0.948)*	*(0.854)*	*(0.958)*
Relative Size	0.006**	0.006**	0.006**	0.006**	0.001	0.001	0.001	0.001	0.010**	0.010**	0.010**	0.010**
	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.471)*	*(0.449)*	*(0.351)*	*(0.353)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*
Market-to-Book	-0.004**	-0.004**	-0.003**	-0.003**	-0.004**	-0.005**	-0.003+	-0.003+	-0.003**	-0.004**	-0.003*	-0.003**
	(0.000)	*(0.000)*	*(0.000)*	*(0.001)*	*(0.003)*	*(0.002)*	*(0.062)*	*(0.052)*	*(0.008)*	*(0.004)*	*(0.011)*	*(0.007)*
EBITD/TA	-0.021*	-0.020*	-0.011	-0.009	-0.021	-0.021	-0.010	-0.010	-0.021+	-0.019	-0.019	-0.014
	(0.016)	*(0.023)*	*(0.252)*	*(0.357)*	*(0.101)*	*(0.107)*	*(0.423)*	*(0.419)*	*(0.094)*	*(0.122)*	*(0.156)*	*(0.280)*
Stock Return	0.006**	0.005*	0.006**	0.006**	0.011**	0.010**	0.011**	0.012**	0.002	0.002	0.002	0.002
	(0.006)	*(0.013)*	*(0.003)*	*(0.003)*	*(0.007)*	*(0.008)*	*(0.003)*	*(0.002)*	*(0.308)*	*(0.472)*	*(0.357)*	*(0.379)*
Public Target	-0.036**	-0.036**	-0.036**	-0.036**	-0.039**	-0.039**	-0.039**	-0.038**	-0.010	-0.010	-0.010	-0.010
	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.560)*	*(0.574)*	*(0.560)*	*(0.567)*
Private Target	0.000	0.000	0.000	0.000	-0.002	-0.002	-0.002	-0.001	-0.002	-0.002	-0.002	-0.002
	(0.956)	*(0.973)*	*(0.914)*	*(0.932)*	*(0.683)*	*(0.733)*	*(0.777)*	*(0.792)*	*(0.383)*	*(0.353)*	*(0.411)*	*(0.375)*
Within-Industry Acquisition	-0.002	-0.002	-0.002	-0.002	-0.009*	-0.009*	-0.008*	-0.009*	0.004	0.004	0.004	0.004+
	(0.328)	*(0.355)*	*(0.426)*	*(0.454)*	*(0.017)*	*(0.016)*	*(0.031)*	*(0.026)*	*(0.118)*	*(0.107)*	*(0.123)*	*(0.098)*
All Cash	0.004+	0.004+	0.004+	0.004+	0.015**	0.015**	0.015**	0.015**	-0.003	-0.003	-0.003	-0.003
	(0.095)	*(0.092)*	*(0.069)*	*(0.078)*	*(0.001)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.164)*	*(0.155)*	*(0.180)*	*(0.171)*
Competed	0.026	0.026	0.025	0.026	0.023	0.023	0.021	0.022	-0.005	-0.006	-0.005	-0.005
	(0.384)	*(0.391)*	*(0.388)*	*(0.385)*	*(0.342)*	*(0.349)*	*(0.354)*	*(0.353)*	*(0.886)*	*(0.864)*	*(0.885)*	*(0.878)*
Hostile	-0.012	-0.011	-0.011	-0.011	-0.003	-0.002	-0.002	-0.003	-0.163**	-0.159**	-0.160**	-0.159**
	(0.436)	*(0.474)*	*(0.491)*	*(0.488)*	*(0.834)*	*(0.865)*	*(0.865)*	*(0.842)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*
Industry M&A Liquidity	-0.005	-0.004	-0.002	-0.001	0.013	0.016	0.017	0.019	-0.014	-0.012	-0.012	-0.011
	(0.703)	*(0.775)*	*(0.881)*	*(0.938)*	*(0.561)*	*(0.488)*	*(0.453)*	*(0.401)*	*(0.441)*	*(0.485)*	*(0.482)*	*(0.541)*
Herfindahl Index	0.005	0.004	0.003	0.003	0.009	0.007	0.005	0.005	0.004	0.003	0.003	0.002
	(0.403)	*(0.473)*	*(0.618)*	*(0.664)*	*(0.417)*	*(0.507)*	*(0.617)*	*(0.664)*	*(0.594)*	*(0.644)*	*(0.677)*	*(0.726)*
Observations	10807	10807	10807	10807	4221	4221	4221	4221	6586	6586	6586	6586
R-squared	0.038	0.038	0.040	0.040	0.062	0.063	0.065	0.067	0.038	0.037	0.039	0.038

Table 9. Capital Structure Adjustments Prior to Acquisitions

The table reports changes in Market Leverage and Market Leverage Deficit for expected acquirers. Expected acquirers have predicted acquisition probabilities exceeding the cut-off probability. Variable definitions are in the Appendix. The p-values are adjusted for clustering by firm. **, * and + stand for statistical significance at the 1%, 5% and 10% levels, respectively.

Panel A. Subsample of Overleveraged Expected Bidders

	Mean Values		Industry Adjusted Mean Values	
	Mean	p-value	Mean	p-value
Change in Market Leverage	-0.017	0.000 **	-0.026	0.000 **
Change in Market Leverage Deficit	-0.046	0.000 **	-0.050	0.000 **

Panel B. Subsample of Underleveraged Expected Bidders

	Mean Values		Industry Adjusted Mean Values	
	Mean	p-value	Mean	p-value
Change in Market Leverage	0.033	0.000 **	0.023	0.000 **
Change in Market Leverage Deficit	0.082	0.000 **	0.063	0.000 **

DATA APPENDIX
(in alphabetical order**)**

- *(All) Acquisitions* refers to all domestic transactions in the U.S. for $1 million or more over a year listed in the SDC-M&A database as an acquisition of majority interest, merger, asset acquisition or acquisition of certain assets.
- *Acquisition Premium* is the ratio of value of components of the offer (i.e., aggregate value of cash, stock and other securities) to the market capitalization of the target 40 days prior to the announcement date.
- *Acquisitions Value / TA* is the ratio of the total dollar volume of (*All) Acquisitions* made by the firm during a year to the firm's *Total Assets* (Item *AT*) at the beginning of the year.
- *All Cash* takes value one if the transaction is paid with all cash.
- *All Stock* refers to all-stock financed *All Acquisitions*.
- *Asset Acquisitions* refers to all domestic transactions in the U.S. for $1 million or more over a calendar year listed in the SDC-M&A database as an asset acquisition or acquisition of certain assets.
- *Asset Acquisitions Value / TA* is the ratio of the total dollar volume of *Asset Acquisitions* made by the firm during a year to the firm's *Total Assets* (Item *AT*) at the beginning of the year.
- *Acquirer* is a dummy variable that takes a value of one if the firm is identified as an acquirer in *All Acquisitions* by the SDC M&A database, and of zero otherwise.
- *Book Debt* is *Total Assets* (Item *AT*) minus *Book Equity* (as defined below).
- *Book Equity* is defined as *Total Assets* (Item *AT*) minus liabilities (Item *LT*) plus balance sheet deferred taxes and investment tax credit (Item *TXDITC*) minus *Preferred Stock* (as defined below).
- *Book Leverage* is *Book Debt* over *Total Assets* (Item *AT*).
- *CAR is the* cumulative abnormal returns to bidders which are calculated over a five-day event window (two days before and two days after the announcement date). The benchmark returns are the value-weighted index of returns including dividends for the combined New York Stock Exchange, American Stock Exchange and NASDAQ.
- *Cash Percentage* is the percentage of cash offered in the transaction.
- *Combo* takes value one if the transaction is paid with a mix of cash, equity and other considerations.
- *Competed* takes value one if there is more than one bidder.
- *Cross-Industry Acquisitions* refers to *All Acquisitions* in which the acquirer and the target do not belong to the same 3-digit SIC.
- *Cross-Industry Acquisitions Value / TA* is the ratio of the total dollar volume of *Cross-Industry Acquisitions* made by the firm during a year to the firm's *Total Assets* (Item *AT*) at the beginning of the year.

- *Cross-Industry Acquirer* is a dummy variable that takes a value of one if the firm is identified as an acquirer in a *Cross-Industry Acquisition*, and of zero otherwise.
- *Expected Offer* takes value one if the predicted probability of being an (*All, Firm* and *Asset*) *Acquirer* in equation 2 exceeds the cut-off probability. The cut-off probabilities for *All, Firm* and *Asset Acquisitions* are 0.13, 0.06 and 0.09, respectively. Please see page 21 on further information on calculation of cut-off probabilities.
- *Firm Acquisitions* refers to all domestic transactions in the U.S. for $1 million or more over a calendar year listed in the SDC-M&A database as an acquisition of majority interest or merger.
- *Firm Acquisitions Value / TA* is the ratio of the total dollar volume of *Firm Acquisitions* made by the firm during a year to *Total Assets* (Item *AT*) at the beginning of the year.
- *Herfindahl Index* is sum of the squares of the market shares of all firms sharing the same three-digit SIC, where market share is defined as sales of a firm (Item *Sale*) to sum of sales with the industry.
- *Industry M&A Liquidity* is sum of *Acquisitions Value* for each year and three-digit SIC code divided by the Total Assets (Item *AT*) of all COMPUSTAT firms in the same three-digit SIC and year.
- *(Market) Leverage Deficit* is *Market Leverage* minus *Target Leverage* (as defined below).
- *Market Equity* is common shares outstanding (Item *CSHO*) times the stock price (Item *PRCC_F*).
- *Market Leverage* is *Book Debt* over *Market Value* (as defined below).
- *Market-to-Book* ratio is *Market Value* (as defined below) over *Total Assets* (Item *AT*).
- *Market Value* is defined as liabilities (Item *LT*) minus balance sheet deferred taxes and investment tax credit (Item *TXDITC*) plus *Preferred Stock* (as defined below) plus *Market Equity* (Item *CSHO* x Item *PRCC_F*).
- *Net Book Leverage* is *Book Debt* minus cash and marketable securities (Item *CHE*) over *Total Assets* (Item *AT*).
- *Net Market Leverage* is *Book Debt* minus cash and marketable securities (Item *CHE*) over *Market Value*.
- *Number of Acquisitions* is the total number of *Acquisitions* undertaken in a year.
- *Number of Asset Acquisitions* is the total number of *Asset Acquisitions* undertaken in a year.
- *Number of Firm Acquisitions* is the total number of *Firm Acquisitions* undertaken in a year.
- *Overleveraged Firm Dummy* takes value one if *Leverage Deficit* falls in the largest quartile.
- *Preferred Stock* is equal to liquidating value (Item *PSTKL*) if available, else redemption value (Item *PSTKRV*) if available, else carrying value (Item *PSTK*).
- *Public Acquisitions* refers to *All Acquisitions* in which the target (as defined by the SDC M&A database) is a public firm.

- *Public Acquisitions Value / TA* is the ratio of the total dollar volume of *Public Acquisitions* made by the firm during a year to the firm's *Total Assets* (Item *AT*) at the beginning of the year.
- *Public Acquirer* is a dummy variable that takes a value of one if the firm is identified as an acquirer in *Public Acquisitions* by the SDC M&A database, and of zero otherwise.
- *R&D Dummy* is a dummy variable that takes a value of one if COMPUSTAT reports R&D expense (Item *XRD*) as missing, and of zero otherwise .
- *R&D / TA* is defined as R&D expenses (Item *XRD*) over *Total Assets* (Item *AT*).
- *Ratio of Acquirers* is the proportion of firms that are listed as acquirers in acquisitions of majority interest, mergers, asset acquisitions or acquisitions of certain assets as defined in the SDC-M&A database.
- *Ratio of Asset Acquirers* is the proportion of firms that are listed as acquirers in an asset acquisition or in an acquisition of certain assets as defined in the SDC-M&A database.
- *Ratio of Firm Acquirers* is the proportion of firms that are listed as acquirers in an acquisition of majority interest or in a merger as defined in the SDC-M&A database.
- *Ratio of Public Acquirers* is the proportion of firms that are listed as acquirers in acquisitions of majority interest, mergers, asset acquisitions or acquisitions of certain assets as defined in the SDC-M&A database, and in which the target is a public firm.
- *Ratio of Within-Industry Acquirers* is the proportion of firms that are listed as *Within-Industry Acquirers*.
- *Ratio of Cross-Industry Acquirers* is the proportion of firms that are listed as *Cross-Industry Acquirers*.
- *Relative Size* is the natural logarithm of the ratio of *Transaction Value* to *Total Assets* of the acquirer at the end of the fiscal year prior to the acquisition announcement.
- *Sales* is the natural logarithm of sales (Item *SALE*) in 1990 dollars.
- *Stock Return* is the firm's annual stock return.
- *Surprise Offer* takes value one if the predicted probability of being an acquirer in equation 2 is lower than the cut-off probability. The cut-off probabilities for *Acquisitions, Firm* and *Asset Acquisitions* are 0.13, 0.06 and 0.09. Please see page 21 on further information on calculation of cut-off probabilities.
- *Target CAR* is the cumulative abnormal returns to target over the period starting 20 days prior to the announcement to 1 day after the announcement day. The benchmark returns are the value-weighted index of returns including dividends for the combined New York Stock Exchange, American Stock Exchange and NASDAQ.
- *Tangible Assets / TA* is net property, plant and equipment (Item *PPENT*) over *Total Assets* (Item *AT*).
- *Target Leverage* is the fitted value of the leverage regression (equation 1).

- *Total Assets* (TA) is measured as the book value of assets (Item *AT*)
- *Transaction Value* is the total value of considerations paid by the acquirer, excluding fees and expenses.
- *Underleveraged Firm Dummy* takes value one if *Market Leverage Deficit* falls in the lowest quartile.
- *Within-Industry Acquisitions* refers to *All Acquisitions* in which the acquirer and the target belong to the same 3-digit SIC.
- *Within-Industry Acquisitions Value / TA* is the ratio of the total dollar volume of *Within-Industry Acquisitions* made by the firm during a year to the firm's *Total Assets* (Item 6) at the beginning of the year.
- *Within-Industry Acquirer* is a dummy variable that takes a value of one if the firm is identified as an acquirer in a *Within-Industry Acquisition*, and of zero otherwise.